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Journal of the Asiatic
Society of Bengal

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL,

EDITED BY

THE SECRETARIES.

VOL. XVII.

PART I.—JANUARY TO JUNE, 1848.

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“ It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away if they shall entirely cease.”—SIR WM. JONES.

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Errata.

- Page 80, line 30, for "stories" read "stones."
 — 490, — 13, for "23 $\frac{1}{4}$ " read "2 $\frac{3}{4}$."
 — 492, — 3, for सुकाम read मुकाम.
 — — — — for गुसरानां read गुसरावां.
 — — — 17, for पैतुम read पैतुम.
 — 493, — 9, for जनौ read जनैः.
 — — — 13, for वदुच्चै read वदुच्चै.
 — — — 14 for यदभि read पदभि.

ANNUAL REPORT.

THE Council of the Asiatic Society having reviewed the proceedings of the year just terminated, are happy in being enabled to congratulate the members on a marked improvement in their affairs.

At the close of 1846, the number of subscribing members was, .. 136
 There have been elected in 1847, 48
 Rejoined the Society on return from Europe..... 5

189

Of which number, deceased during 1847..... 3
 Resigned, 8
 Proceeded to Europe,..... 12

23

166

Showing an increase above all casualties of 30 Subscribing Members during 1847.

The Honorary Members are, 42
 The Associate Members,..... 11

Total, 219

FINANCES.

In conformity with the resolution passed in October 1846, the officers of the Society then elected, proceeded on their receiving charge on the 16th of November 1846, to liquidate the old debts of the Society from the proceeds of the sale of Company's paper, and the Cash balance in the Bank of Bengal. Their next care was to publish the whole of the accounts for the previous years, as received from the then Accountant, Mr. Bolst, and which accounts had not been previously printed. Mr. Muller having been appointed on the 16th Nov. to succeed Mr. Bolst as Accountant under the directions of the Senior Secretary, the accounts now submitted commence accordingly from that date, 16th November 1846, balanced to the end of 1846; and a separate account is rendered for all

1847. The Secretaries and Accountant request permission to place on record that their strict responsibility for the application of all funds according to the instructions of Government and the resolutions of the Society, commences with the 1st January, 1847, as during the preceding six weeks the income of the Society from all sources, was under pre- engagements, over which they had no control.

The Council now submit—

1. Statement showing the amount of Government paper and the Cash balance received to the credit of the Society from Mr. Bolst, on the 16th November 1846.

2. An abstract statement of the old debts of the Society paid from the sale of the Company's paper and cash balance thus received.

3. Abstract statement of accounts from 16th Nov. to 31st Dec. 1846.

4. Abstract statement of accounts from 1st January to 31st Dec. 1847.

5. Detailed statement of account of the Oriental Publication grant of 500 Rs. per mensem, in account current with the Asiatic Society, from the 1st Jan. to 31st December 1847.

Statement showing the amount of Co.'s Papers and Cash received from Mr. Bolst, and how disposed of in liquidation of old debts.

		RECEIPTS.	Co.'s Rs. As. P.		
Co.'s Papers.	{ for Sa. Rs.	4,000	} sold for	13,137	13 11
	{ Co.'s Rs.	8,800			
Cash,		1,309 12 9			
Ditto acct. Journal,		482 0 4			
				1,791	13 1
			Co.'s Rs. ..	14,929	11 0

DISBURSEMENTS FOR OLD DEBTS.

Mr. Bird's Portrait,	1,368	8	9
Bishop's College, arrears for printing Journal, &c. from January 1843 to May 1846,	7,441	15	0
Baptist Mission Press arrears for printing Journal down to July 1843, ..	418	0	0
Messrs. Currie and Co. for Almirah, &c.	425	14	0
Messrs. Ostell and Lepage for Books,	122	4	0
Mr. Blyth's arrears of Salary from 1st May 1844, to October 1846, at 100 Rs. per month,	3,200	0	0
Ditto House Rent from January to November 1846 at 40,	440	0	0
Mr. Piddington's arrears of Salary,	200	0	0
Sundry arrears,	1,313	1	3
			Co.'s Rs. .. 14,929 11 0

E. L.

The Accounts herewith published show the total receipts from all sources during the year 1847, to have been, ∴ 28,731 15 6

Of which Government allowances, 13,664 0 0
 Subscription from Members, 9,569 13 6
 Journal and sale of Publications, 1,728 0 0
 Sundries, ∴ 47 14 3

25,009 11 9

Co.'s Paper received from Mr. Bolst, and sold during this year to pay Mr. Blyth's arrears of salary, 3,722 3 9

Co.'s Rupees, 28,731 15 6

Balance of 1846, 2,270 0 6

Do. from Journal, 482 0 4

2,752 0 10 31,484 0 4

The expenditure has been—On account of Oriental Fund—Invested in Co.'s

Paper, 3,997 2 1

Sundry expenditure, 2,332 11 11

6,329 14 0

Geological and Mineralogical department, 3,805 3 3

Zoological Department, 9,363 14 9

Journal, including 7 Nos. of former year, 4,800 9 4

Library, 3,016 3 4

Secretary's office, 1,255 9 0

Sir A. Burnes' Drawings, 1,001 15 0

Miscellaneous, 905 10 5

30,479 4 1

The accounts further show that the Government Contributions have been carefully applied during the year to the purposes for which the Funds were granted.

Thus—for the Oriental Fund, the receipts have been, 6,031 14 0

Disbursements, 2,332 11 11

Funded to Oriental Acct. 3,997 2 1

6,329 14 0

Dr.	<i>Zoological Museum.</i>	Cr.
To Amount of Mr. Blyth's Salary as Curator for 12 months at 250 Rs. per month,	3,000 0 0	By Amount of allowance authorized by the Court of Directors for the Services of a Curator for 12 months at 250 Rs. per month, 3,000 0 0
„ Ditto house rent for ditto at 40 Rs. per month,	480 0 0	„ Ditto for preparation of specimens at 50 per Do.
„ Ditto in full of the arrears of his Salary from 1st May 1844 to October 1846, at 10) Rs. per month,	*3,200 0 0	„ Amount of fines,
„ Ditto Establishment of Taxidermists, Artists, Carpenters, &c. for 12 months	1,750 0 0	„ Ditto of empty bottles sold,
„ Ditto of Contingencies for ditto,	793 7 3	3,609 8 3
„ Ditto paid by Mr. A. Campbell to Mr. Holquett for proceeding to Dargueeing in November 1842, . . .	*70 0 0	Co.'s Rs. . . 3,609 8 3
„ Ditto of a Glass case for depositing Shells,	70 7 6	
Co.'s Rs. . .	9,363 14 9	

Dr.	<i>Museum Economic Geology.</i>	Cr.
To Amount of Mr. Piddington's Salary as Joint-Curator for 12 months at 250 Rs. per month,	3,000 0 0	By Amount of allowance granted by Government for the services of a Joint-Curator for 12 months at 250 Rs. per month,
„ Ditto of Establishment for ditto at 31 Rs. per month,	372 0 0	„ Ditto for Establishment and contingencies for ditto at 64 Rs. per ditto,
„ Ditto of Contingencies for ditto,	149 13 0	„ Ditto for four Glass Cases,
„ Ditto for 4		
„ Glass Cases granted by Government for the use of the Museum,	296 0 0	
„ Less paid on the 24th November 1846,	80 0 0	
Sundries,	67 11 3	
Total Co.'s Rs. . .	3,805 8 3	4,064 0 0

* These two items constitute extraordinary expenses defrayed from the Society's assets, and show the regular year's outlay in this department to have been Rs. 6,093 14 9.

Liabilities and Dependencies.

The Journal has been paid for up to the end of the 2nd Quarter of 1847, and there remain due for the 3rd and 4th quarters, including the December No., errors excepted,.....	Rs.	2,000	0	0
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To meet this the Society has in reserve the whole of the collections still to be made for the last quarter of 1847, and the average amount of which will be, errors excepted,		2,300	0	0
Subscriptions to the Journal up to Dec. 1847.		1,700	0	0

Total, 4,000 0 0

Excluding these two items the result of the year has been, that defraying all expenses and incurring no fresh debts or liability, and strictly applying all grants from Government to the precise purposes for which these were conceded, there is a cash Balance in the Society's favour of Rs. 504 12 3 on the total income and expenditure of the year—there is also a *surplus* and certain dependency above liabilities, accruing from Subscriptions and Journal, of at least 2000 Rs. fairly available for next year, in addition to ordinary income and to the collections of arrears of subscriptions, now Rs. 5000, not including the last quarter's subscriptions, of which arrears one half may be fairly expected to be realized in all 1848.

Stringent resolutions having been passed at the October meeting for the removal from the list of Members of all those who are in arrears of more than 15 months' subscriptions, 3 months' notice having been given, the Council advise that this resolution be carefully attended to and enforced. They further recommend that the old practice of the Society to absolve members of 20 years' standing from any further payment, be recognised as a formal rule.

Propositions having been received from two members of the Society for the reduction of the rates of subscriptions, the Council have carefully considered the proposal, and in consultation with their Accountant have

unanimously agreed that no reduction is practicable, consistent with the efficiency and safety of the Society. Two members have also complained that, residing in the Mofussil, they derive no advantage from the Society beyond the receipt of the Journal. On this the Council observe, that it is manifestly the duty, as well as the interest of the Society, to facilitate in every practicable manner, the researches of its members, by providing standard works of reference in the Library—by permitting such works as extensive circulation as is consistent with their safety—by the formation of standard collections of specimens for comparison in the several Museums—and above all by the maintenance of a Periodical Journal, in which the researches of members may find immediate and extensive publicity. The Council are willing to consider favorably any proposition that may be made for remedying the inconvenience complained of, and for rendering, under due precautions for the safety of the Books and other articles, the Library and collections of the Society more available to members resident in the Mofussil. The Council however, are not at present prepared to suggest any specific measure on this subject, and conceive that any measure of the kind that may be proposed will require to be very carefully considered.

PUBLICATIONS.

Under the head of Publications the Journal claims the most conspicuous notice.

On the change of officers in November 1846, the Journal was 7 months in arrear. All these numbers have been published and paid for, and this year's series completed by the issue on the 7th of January 1848, of the number for the previous month. The 12 Nos. for the year form a Volume of 1277 pages, with index, illustrated by numerous plates, and containing a mass of original papers, embracing a wide range of subjects of interest and value to the Philologist and Antiquarian, as well as to the cultivators of natural and physical science.

The Council cannot permit this occasion to pass by without recording their grateful sense of the important services rendered in this department during the past year by their Co-Secretary, Mr. Laidlay, under whose management the Journal has been almost exclusively edited.

The zeal, ability and indefatigable industry with which Mr. Laidlay has discharged this laborious duty, entitle him to the marked thanks of the Society.

For the information of contributors to the Journal, it is desirable to add, that 333 copies are regularly circulated, of which, 169 to Members, 53 to subscribers not Members, 40 to the Hon. the Court of Directors, 60 to Europe generally, and 11 to learned Societies and individuals.

By a vote of the November meeting, *Honorary* Members residing in Europe, are entitled to receive the Journal gratis, on application to the Agents in London, Messrs. Allen and Co., to whom 40 copies are regularly forwarded by each monthly steamer from Calcutta.

With reference to the very large stock of the "Researches" in store in the Library, or in charge of the home agents, the Council propose that all members who have paid up one year's subscription, and all *Honorary* members, be held entitled to a copy of each volume of the "Researches" available above five sets retained for the Library.

Oriental Publications.

The Society are aware of the active measures taken during the past year to fulfil the desire long since expressed by the Hon'ble the Court of Directors, for the publication in India of a complete Edition of the Vedas, with a Translation and Commentary. Having confided this important task to their accomplished Co-Secretary, Dr. Roer, the Council heard with regret in November, that their views and Dr. Roer's labours had been directed in vain, and that such progress had already been made in England under the patronage and at the expense of the Honorable Court in the Edition of the same Veda on which Dr. Roer was employed, that it became necessary to discontinue the Calcutta Edition.

As the Yajur Veda and Sāma Veda are also in course of publication in Berlin and St. Petersburg, the Council earnestly invite the attention of the Society to an able minute by Mr. Laidlay, regarding the works which should be now undertaken, and the manner in which these should be published. Mr. Laidlay proposes the monthly issue of a companion number of the Journal, containing Serial portions of Editions of such standard Oriental works as may be thought most

desirable to issue. He suggests the employment of an Editor, and native assistant, on salaries together not exceeding 150 Rs. per mensem, the control of the work to be vested in the Oriental Section.

Fully concurring in Mr. Laidlay's views, the Council advise their adoption, and recommend the appointment of Dr. Roer as Editor, under the superintendence of the Oriental Section. The Council are of opinion that in justice to Dr. Roer, a certain portion of his Edition of the Vedas should form the 1st and 2d Fasciculus of the proposed work. They are convinced that this publication will afford satisfactory proof of Dr. Roer's high qualifications for the difficult and laborious duties he has undertaken to perform. They also suggest the reinforcement of the Oriental Section by the appointment of Mr. H. M. Elliot and Mr. W. Seton Karr, who have recently arrived at the Presidency, and whose attainments in Oriental literature are so well known to the members of the Society.

Considering the importance of obtaining the co-operation and advice of eminent Oriental Scholars in India and in England, in order successfully to carry out the purposes for which the Government grant was bestowed, the Council recommend that the following names of distinguished non-resident Orientalists be added to the Section, and that these gentlemen be requested to lend as occasion may offer, their earnest and effective assistance to the resident Committee as an additional assurance to the Hon'ble Court of the Society's anxiety, as well as ability, to accomplish the objects of this grant.

Professor Horace Hayman Wilson—Mr. Hodgson, Dr. Sprenger, Mr. Walter Elliott, and Dr. Bird.

Mr. Bushby at the same time desires to be relieved from the duties of this Section.

LIBRARY.

The Library has been augmented during the year to the extent of 257 volumes, a new catalogue has been prepared by the Librarian and approved of by the Council, and should be printed without further delay. The number of Books borrowed by subscribers during the year has been 1150 volumes. The Council have every reason to be satisfied with the manner in which the Librarian has discharged his duties. He has been punctual in attendance, and has in all other respects acquitted himself in a very creditable manner. It deserves special notice that by his zeal

and exertions the sale of the Oriental Publications has been remarkably increased (from Rs. 777 7 3 in 1846, to Rs. 1706 12,) in the year now terminated.*

The Council regret to state that the Naturalists of the Society complain justly of the very scanty supply of standard books in their Department of the Library. Admitting and lamenting the deficiency, the Council are unable to advise any immediate measure for the supply of the requisite works, which are so costly that their purchase would cause an expenditure of from 10,000 to 15,000 Rupees. An efficient Library Committee would probably be enabled to do much within a reasonable time towards obviating the defect complained of, by a judicious use of the profits accruing from the sale of the Society's publications, and by a system of exchanges with other learned Institutions. The appointment of a Library Committee seems the first step which should be taken, and the Council accordingly propose that Dr. Walker, Dr. Roer, Mr. Wilby, Mr. J. W. Grant, Mr. Elliot and Mr. Welby Jackson, be requested together with the Secretaries, to act as this Committee, and examine into and report on the best means of supplying the most important works of reference required in the different departments of the Society's labours—and to report upon the practicability or otherwise of extending the circulation of works of reference to the Mofussil members.

THE GENERAL MUSEUM

Of Antiquities and Curiosities has been enriched by numerous and valuable donations. An ample and interesting catalogue has been prepared by the Librarian, approved of by the Council, and will, with the Catalogue of the Library, be printed immediately.

The number of visitors to the General Museum has been very large during the past year, over 16,000 persons having been admitted. It is satisfactory to add that although the humblest classes have been allowed free access, no theft or injury to any article has taken place,

* Statement of the amounts received by the Sale of Oriental Publications.

In 1842	Rs. 829 8 0
„ 1843.....	696 8 0
„ 1844.....	424 4 9
„ 1845.....	1047 10 0
„ 1846.....	777 7 3
„ 1847.....	1706 12 0

a result, the Council consider, creditable to the vigilance and attention of the resident sergant, Mr. Halagan, whose services they consider of proved value to the Society.

NATURAL HISTORY.

In the Department of Natural History numerous additions have been made to the Society's collections, most of which have been described in the Reports of the Curator Mr. Blyth, whose regularity of attendance and remarkable industry the Council consider deserving of favourable notice. It is however a subject of great regret to the Council, and of complaint on the part of numerous members, that no Catalogue exists of any part of the collections under Mr. Blyth's care. The Executive officers of the Society have at the instance of the Council repeatedly urged this deficiency on Mr. Blyth's attention, but as yet without result. The Council now advise that the Curator be formally instructed to prepare a descriptive Catalogue without further delay, and submit the same by monthly portions through the Section of Natural History, to the Council, and the Society at large. It is further recommended that Lord Arthur Hay and Dr. Walker be elected members of the Section of Natural History, and that the Section be invited to report monthly on the progress made in the Catalogue, as well as on any other matters of interest in their department.

An application has been received from Mr. Blyth since the December meeting, in which he seeks a recommendation in his behalf to the Hon'ble the Court of Directors in support of his claim for increase of pay, and for a retiring pension, after a certain period of additional service.

Without entering on discussion as to Mr. Blyth's particular services, the Council submit his request to the consideration of the Society at large. It must be admitted, that for any scientific man capable of discharging the duties on which Mr. Blyth is employed, and performing these with activity and zeal for the advancement of science and the improvement of the collections of a public Institution, the salary of 250 Rupces is a very inadequate compensation. But the Council cannot but regard the present as an inauspicious period to address the Hon'ble Court in furtherance of any pecuniary claim. The diversion of the Oriental grant to so large an amount as has but lately been

brought to notice, cannot be regarded with indifference by the Hon'ble Court, nor can it have disposed them to entertain with much favour any fresh demand on their munificence preferred by the Society. With these remarks the Council submit Mr. Blyth's application to the consideration of the meeting, recommending that it be referred to the section of Natural History for their report to the Council prior to the next meeting, and that the Section be invited to inquire into and report on the state of the Museum of Zoology, the extent to which the Society are indebted to Mr. Blyth for his services in that department, and to offer such suggestions as to its improvement and extension as they may deem desirable.

DEPARTMENT OF GEOLOGY AND MINERALOGY.

The acquisitions of specimens and collections have been numerous during the year—the reports of the Curator valuable. The Council are happy to record their satisfaction with the arrangements and cataloguing by the Curator, Mr. Piddington, of the part of the Museum under his control.

In reviewing the subject of the Collections, Museums and Library, the Council wish to take prominent notice of the very insufficient space for arrangement, display or even preservation, of their property, afforded by the present premises. In every department collections of great value are so heaped together that their utility and even their interest are almost nullified. The Society generally are but little aware of the riches they possess, and which more ample space would enable them to display with equal advantage to the public and credit to themselves.

The Government have within the last month liberally conceded to the Society the small piece of ground on the Chowringhee front, lately occupied as a Police Thanna. With this ground available there exists sufficient room for the erection of a Museum, in which the Sculptures, Busts and Monuments, the fossils, Osteological and Mineralogical collections, with the arms, standards, pictures and models, could be displayed in a manner worthy of this Society, and even of national importance, as evincing the encouragement afforded by Government and the Society to the cultivation of every branch of science and literature connected with the history, the manners, the arts and productions of India.

The difficulty which exists as to the execution of this plan is the want of adequate funds, and this is increased by the present commercial pressure and the circumstances which discourage any present application to Government for pecuniary assistance. The Council are nevertheless of opinion that the object may be accomplished with success and safety, by having the requisite buildings erected on mortgage of the new premises, and which would entail a monthly charge of from 150 to 200 rupees a month. This may partly be met at first from the proceeds of sale of duplicate specimens of Natural History, and by the opening of a subscription among the members, and by the surplus income of the Society, which may next year be fairly expected to reach 3000 Rs. Subsequently whenever vacancies arise, the Council consider it would be highly advantageous that the *Curators* in the Zoological and Geological departments should be also *Professors and Lecturers* in their several branches, and that courses of lectures for elementary instruction be delivered on *Geology and Mineralogy* and on *Natural History*, open to the public and to regular pupils, on the payment of a moderate fee, the proceeds to be applied to the rent charge, and to the remuneration of the Professors in addition to their present scale of allowances. The Council have reason to believe that such classes would command a numerous attendance, and be very favourably regarded by the public. By this addition to their sphere of exertion the Society would assimilate itself to the Royal Institution of London and the Royal Society of Dublin—and would soon establish such enhanced claims on the consideration of Government as might justify a claim for considerable assistance towards the liquidation of the mortgage debt.

Impressed with the importance of this subject, the Council propose that the President, Mr. Bushby, Mr. J. Ward, Mr. Grey, and the Secretaries, be appointed a special Committee to examine and report on the practicability of carrying the proposed measures into effect. Meanwhile the Council should be authorized to enclose the piece of ground granted by Government, and take the requisite steps for the repairs of the present premises, now urgently required; to provide the requisite means for which the cash balance and surplus dependencies from 1847 should be reserved exclusively.

GENERAL ARRANGEMENTS, RULES, &c.

The Council have to report their opinion that the appointment of Sections has been attended with much success, and recommend their re-election for the ensuing year. Some discussion having arisen as to the mode of election of the Secretaries to the Sections, the Council now advise that each Section or Committee appoint its own Secretary, subject to confirmation by a general meeting—further that each Section be authorized to appoint not more than four corresponding members, not members of the Society, who may be residents in India, liable to re-election, and having no voice or vote in the Society's discussions or affairs. The Council again consider it necessary to urge that the functions of the Sections be limited to those already prescribed, and that they can have no control over Funds, nor dispose of collections, nor institute any official correspondence, except with the Society itself and their own regular corresponding members. The President and Secretaries should moreover, in the opinion of the Council, be *ex-officio* members of all Sections.

Rules.

To obviate as much as possible the occurrence of discussions which may interrupt the scientific or literary proceedings of the Society, the Council advise that no change of rules or institution of new rules shall take place in future, except at the annual meeting, or at an extraordinary meeting convened for the purpose, on the requisition of 12 members, addressed to the President.

The rule prohibiting the publication of the "Proceedings" till after having been submitted to the following meeting, the Council recommend to be abolished, as useless and inconvenient. The proceedings of the meetings are but a 'Proces Verbal' of the facts which have occurred—and delaying their publication retards that of the Journal—deprives contributors of what is so valuable to many, the immediate publication of the date of presentation of their papers—and withholds from the public for at least a month numerous miscellaneous notices of discoveries and literary researches, which to the mass of readers and the public generally constitute the most interesting portion of the contents of the Journal. As however experience has shown that in reporting the proceedings oppor-

tunity is afforded for the insertion of opinions or expressions to which members may reasonably object, it is recommended by the Council that the report of proceedings be signed by the Secretary and countersigned by the President of the evening, who thus become individually responsible for the restriction of the report to the mere business of each meeting.

COUNCIL.

The functions of the Council should, to obviate embarrassment, be defined by rule, to be what in practice these have always been, that of a managing body empowered to represent the Society on all urgent occasions, and to have entire control over all honorary or paid officers of the Society, subject to the approbation of a general meeting, and restricted from incurring any expenditure above Rs. 200, except by a vote of the Society. It is recommended that their number be increased to 12, and that Dr. Walker, Mr. Seton Karr, Lord Arthur Hay and Dr. James Dodd, be elected members for the ensuing year.

PRESIDENT.

The Council are unanimously of opinion with respect to this office, that the original practice of the Society should be reverted to; that the Governor General should be respectfully solicited to become the *Patron* (not President) of the Society, and the Council be authorized to take the necessary steps on Lord Dalhousie's arrival, to submit the desire of the Society to his Lordship's consideration; further that a President be elected from their own body. The Council accordingly are happy to announce that they have received a requisition from 27 resident members* inviting Mr. J. W. Colvile, the Advocate General, to accept

* The undersigned, Vice-Presidents and Members of the Asiatic Society, being of opinion that the old and established usage of the Society regarding the office of President should be reverted to, on the occasion of the vacancy about to take place by the departure of Lord Hardinge, have the honor to propose for the consideration of the Council, and recommendation to the Society at the next general meeting, that Mr. J. W. Colvile be elected President of the Society.

Asiatic Society, 28th Dec. 1847.

D. CALCUTTA.

J. P. GRANT.

G. A. BUSHBY.

W. GREY.

J. W. LAIDLAY.

DEBENDERNATH TAGORE.

the office about to be vacant by Lord Hardinge's departure.* The Council unanimously recommend Mr. Colvile's election, feeling persuaded that it is not in some special acquirement, such as that of Oriental learning, or in the profound knowledge of some department of natural or physical science, that the most requisite qualifications for their President consist. General ability, love of literature and science, anxiety for the interests and advancement of the Society, courtesy and encouragement to its members and punctual attendance at its meetings, would in the opinion of the Council, constitute qualifications very much more conducive to their prosperity and effectiveness. The Council consider the election of Mr. Colvile the best which could be made upon these views, and they accordingly recommend that it take place at the next general meeting after Lord Hardinge's departure.

They further advise that as a mark of their high sense of the value of Mr. Laidlay's great exertions during the past year, that gentleman be elected a Vice President of the Society, retaining his office of Co-Secretary; further that Mr. H. M. Elliot be elected a Vice President, in succession to Colonel Forbes.

The Council lastly repeat their congratulations on the improvement which has taken place in the circumstances and efficiency of the Society, on the increase to its number of members, and the improvement of its finances, exhibiting for the first time for several years, a balance on the credit side, notwithstanding the exact application of each fund to its special and authorized use. The Council also observe with much pleasure

ARTHUR BROOME.	W. SETON KARR.
JOHN H. PRATT.	H. L. THUILLIER.
W. B. O'SHAUGHNESSY.	G. LAMB.
WELBY JACKSON.	R. W. FRITH.
JAS. DODD.	HOREEMOHUN DEY.
JAS. C. THOMPSON.	T. E. ROGERS.
S. SLATER.	ROMMANATH TAGORE.
J. W. GRANT.	NREPENDERNATH TAGORE.
E. CURRIE.	S. G. T. HEATLY.
WM. KEANE.	RAJAH RADHAKANT DEB.
D. STEWART.	

* It having been previously ascertained that the senior Vice-Presidents, the Lord Bishop of Calcutta and the Hon'ble Sir John Peter Grant, the former on account of delicate health, and the second with reference to his being about to leave India, could not accept the office of President, if elected.

the strong inclination which manifestly exists and is increasing among the members to renewed efforts to maintain the long proved reputation of the Society, and to add to its claim on public estimation. The pages of the Journal are again enriched by the essays of some of the Society's oldest and most honoured members and contributors, among whom the names of Hodgson, J. D. Cunningham, J. Abbott, Cantor and Kittoe, are entitled to conspicuous mention. New writers of brilliant promise have come forward in numerous departments. The sister Institution of Delhi, founded within the year, has ably seconded their efforts by contributions, which have much increased the value of the Journal. The new year is thus opened under every favourable omen,—the fulfilment of which seems certain, by perseverance in the course which has led to the results now reported for the information of the Society.

(Signed) W. B. O'SHAUGHNESSY,

Senior Secretary.

The Report having been read, Mr. Wm. Grey said he had reason to believe that the Senior Secretary had omitted a paragraph which the Council had requested to be added to the Report, and he moved that the paragraph be read.

Capt. Thuillier having seconded the motion,

Dr. O'Shaughnessy explained that he had received the paragraph in question, for which he felt most grateful to the Council of the Society, but he begged to be permitted to reserve it as a private testimonial, and not to publish it with the Report.

Minute on the Oriental Publications of the Asiatic Society.

About ten years have elapsed since the Hon'ble Court of Directors granted a munificent and ample allowance to the Asiatic Society, for the publication of standard Oriental Works; leaving to the Society, to a considerable extent, the free exercise of its discretion, both in the selection of such works and in the mode of publication. How ill the Society has responded to this expression of confidence, is a matter of painful consciousness to us all, and need not be further discussed on the present occasion. But as the strongest possible incentive to the adoption of some well considered plan of operation for the future, I

may briefly remind the Council that the result of the last ten years' means and opportunities amounts to the publication of the 4th Volume and the Index of the Mahabhárat,—the Shuraya-ul-Islam,—the Istillahat Sufeyah,—and the Tawarikh i Nadiri,—(each consisting of one volume); unless indeed in addition to these we claim the very questionable merit of having patronized from the Oriental Fund, sundry other works undertaken on private speculation.

The Society at the beginning of the present year, feeling very sensibly its past neglect, adopted stringent measures to prevent the future misapplication of this Fund; and in compliance with the understood wishes of the Court of Directors, resolved to commence immediately the publication of the Vedas. This important work was accordingly entrusted to the management of Dr. Roer, with every prospect of its being conducted in a manner creditable alike to himself and to the Society, under whose auspices he laboured. But scarcely had some little progress been made, when the views of the Society were frustrated by the recent resolution of the Hon'ble Court to publish these venerable works in England under the superintendence of Professor Wilson and Dr. Max. Muller! So that at the end of a year since the Society bestirred itself to redeem its lost time, and after many months of unwearied exertion on the part of Dr. Roer, our gratuitous, but able and willing labourer in the field assigned him, we find ourselves no further advanced than before, and more than ever liable to the withdrawal of the grant so long continued under circumstances but little calculated to elicit the approbation of the munificent donors.

Under these circumstances, and especially at the present season, when our arrangements are about to undergo revision at the annual meeting, I beg leave, with great deference, to lay before the Council a plan for the publication of Oriental works in future, which after much consideration, and much discussion with parties well qualified to form an opinion, I am inclined to think will prove the best means of accomplishing the objects for which the Grant was originally bestowed. My proposition is briefly this: That the Government grant, instead of being allowed to lie any time idle and accumulate, should be expended *monthly*, in the regular publication of a fasciculus, or livraison, consisting of the whole or a portion of some Oriental Work, printed uniformly with the Journal, to which indeed it would form a most appropriate supplement or com-

panion. By the adoption of this measure, there is every reason to believe that a great impulse would be given to the cause of Oriental Literature, and that much more might be accomplished towards the fulfilment of the wishes of the Hon'ble Court, than by more casual and desultory labours, resulting in the publication, at distant intervals, of ponderous and ostentatious tomes, such as now encumber our shelves. A work like that now proposed would soon become an indispensable appendage to every Library of any pretensions; and would be in large demand as well here as in Europe, if each text be accompanied, as I propose it should be, by an English version, making it accessible to the many accomplished and earnest investigators of the Literature, History, and Archæology of India, to whom the original is a sealed book.

To carry out this project, there would be required (besides the hearty and effective co-operation of the Committee and of Oriental scholars generally) a paid and responsible Editor, with an adequate native staff, acting under the immediate controul and direction of the Oriental Section, itself subordinate to the Council of the Society. For this purpose the fund appears very ample. A monthly number, consisting of from 80 to 100 pp. at a cost of say 2 Rs. per page for 500 copies, would amount to Rs. 200, leaving a surplus of Rs. 300 for the remuneration of the Editor, and his native assistants, the purchase or transcription of MSS., and the formation of a reserved fund, to be set apart for such other purposes in connection with the objects of the grant as the Society may hereafter see fit to promote; it being no part of the present plan that the whole grant should be expended in the way suggested; at all events till experience shall have proved the propriety of doing so.

As to the class of works to be published in the manner indicated, it were presumptuous in me to do more than allude to the subject. That portion of Dr. Roer's edition of the *Rig Veda*, now ready, would occupy about four numbers of the proposed work; the *Lalitá Vistára*,* (an account of the life and esoteric doctrines of Buddha) would be an

* Our able librarian, Babu Rajendralal Mitra, undertook an edition of this work some months ago at my suggestion, and has, I believe, made some progress in it. The only copy of this work in Calcutta was supplied by Mr. B. H. Hodgson, who with his usual liberality and zeal has kindly sent to Nepal for other copies, to enable us to rectify the text by collation.

interesting work to follow ; or some of the *Bramanas*, or *Upanishads*. But I would not confine our attention *exclusively* to Sanskrit literature, though it should, for manifest reasons, form our *principal* staple. Arabic and Persian works of *Indian* interest would be welcome to a large body of our members ; though the more *general* literature of these languages might be safely left to the care of European scholars, or of such Muhammadan Governments as seem both able and willing for the task.* There are works in Pali which would come within the scope of the proposed publication as occasion offered : nor is Burmese literature devoid of interest ; as witness the *Dhamathat*, or Burmese “ Laws of Menu,” recently (but owing to the translator’s death, very unsatisfactorily) published at Maulmein. Still the literature of the great family of nations subject to the government of the munificent bestowers of this grant, would of course form the object of our peculiar and grateful attention. On this part of the subject I shall venture no further however ; if the proposed plan meet the approbation of the Council generally, the details will receive the consideration of gentlemen immeasurably more competent to the task than myself.

I may observe in conclusion, that among the advantages of the proposed arrangement, we should always be *progressing* : interest would thus be kept alive to our efforts, and we might expect very important assistance from quarters whence it is impossible to derive it at present. Many of our countrymen scattered in remote parts of India would come forward to our aid, and as there is every reason to believe that many valuable works exist in the libraries of native Princes, these through their instrumentality might be rescued from obscurity and neglect.

Another very important advantage of this mode of publication would consist in the opportunity it would afford of availing ourselves from time to time of the suggestions of distinguished Orientalists, and improving the work as it advanced. In short, I have little doubt that the proposed mode of applying the Government grant would give an impulse to the cause of Oriental literature similar in kind to that given to other branches of the Society’s pursuits, by the publication of its

* Many Arabic works are published at Cairo : at Constantinople, chiefly translations in Turkish.

papers in the convenient form of the monthly Journal, instead of that of the Researches.

I may add that nearly half a century ago a somewhat similar project was entertained by the Society, when it was resolved to publish, when means admitted, a '*Bibliotheca Asiatica*,'* consisting of select Oriental works. We now possess the *means*, and if properly applied, these will enable us to accomplish with the utmost facility here, what is attended with infinite labour and difficulty to the persevering scholars of Europe, and in the course of a few years, to amass a body of Indian Literature which cannot fail to reflect the highest credit upon the Society with whose name it would be associated.

J. W. LAIDLAY,

Co-Secretary.

* '*Indica*' would perhaps be a better name in the present case.

Dr.

Memo. of Account of the Asiatic Society, from 1st to 16th November, 1846.

Cr.

RECEIPTS.		DISBURSEMENTS.	
TO ORIENTAL PUBLICATIONS :—		BY SECRETARY'S OFFICE :—	
Received from Baboo Raj Krishna Mitter, Offg. Librarian, for sale of Oriental Works,	Rs. 41 0 0	Paid Establishment and Contingencies for Oct. 1847, ..	118 14 6
TO CONTRIBUTIONS :—		BY MISCELLANEOUS :	
Received from R. Houston, Esq., subscription per bill No. 2678,	16 0 0	Paid Discount on Government Allowance bills from July to October 1847,	4 5 6
	<hr/> 57 0 0		<hr/> 123 4 0
To Balance as per account closed and rendered by Mr. W. H. Bolst, on the 31st October 1846,	1,004 15 2	By Balance in favor of the Society,	938 11 2
	<hr/> Co.'s Rs. 1,061 15 2		<hr/> Co.'s Rs. 1,061 15 2

E. E.

Calcutta, 16th November, 1846.

N. B. Balance as per Cash Book kept by Mr. Bolst, is Co.'s Rs. 1,309 12 9

Dr. *Abstract Statement of Receipts and Disbursements of the*

RECEIPTS.

To MUSEUM.

Received from the General Treasury, being the allowance authorized by the Honorable The Court of Directors for the services of a Curator, for October and November, 1846, at 250 Rs. per month, .. Rs.	500	0	0	
Ditto ditto for preparation of Specimens for ditto at 50 Rs. per month,	100	0	0	
	<hr/>			600 0 0

To MUSEUM ECONOMIC GEOLOGY.

Received from the General Treasury, being the allowance granted by Government for the services of a Joint Curator, for October and November, 1846, at 250 Rs. per month,	500	0	0	
Ditto ditto for Establishment and contingencies for ditto, at 64 Rs. per ditto,	128	0	0	
	<hr/>			628 0 0

To LIBRARY.

Received by Sale of Books,	3	6	6	
	<hr/>			3 6 6

To ORIENTAL PUBLICATIONS.

Received from the General Treasury, being the amount of monthly allowance granted by Government for October and November, 1846, at 500 Rs. per month,	1,000	0	0	
Received by sale of Oriental Works,	65	0	0	
	<hr/>			1,065 0 0

Carried over,	<hr/>			2,296 6 6
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Asiatic Society from 16th Nov. to 31st Dec. 1846.

Cr.

DISBURSEMENTS.

BY MUSEUM.

Paid Mr. E. Blyth's salary as Curator for October and November, 1846, at 250 Rs. per month,	500	0	0	
Paid his allowance for house rent from January to November, 1846, at 40 Rs. per month,	440	0	0	
Paid Establishment of Taxidermists, Artists, Carpenters, &c., for October and November 1846,	279	8	0	
Paid Contingencies for October, November and December, 1846,	196	5	3	
Paid Messrs. Currie and Co. for Teak Wood Tables, Shelves, &c. &c.	425	14	0	
				<u>1,841 11 3</u>

BY MUSEUM ECONOMIC GEOLOGY.

Paid Mr. H. Piddington's Salary as Joint-Curator for October and November, 1846, at 250 per month, ..	500	0	0	
Paid Establishment for October and November, 1846, at 31 Rs. per month,	62	0	0	
Paid Mr. H. Piddington advance on account of 4 cases sanctioned by Government,	80	0	0	
Deduct Balance of Cash in his hands—account contingencies,	4	2	2	
				<u>75 13 10</u>
				637 13 10

BY LIBRARY.

Paid Babu Raj Krishna Mitter his Salary as Officiating Librarian, from 1st October to 4th November, 1846 at 80 Rs. per month,	90	10	8	
Paid Babu Rajendralall Mittra's Salary as Assistant Secretary and Librarian, from 5th to 30th November, 1846, at 100 Rs. per month,	86	10	8	
Paid Mr. J. Tucker as Assistant Librarian, from 1st to 21st October, 1846, when his services were dispensed with,	28	0	0	
Paid Establishment for October and November, 1846, at 52-8 per month,	105	0	0	
Paid Contingencies for ditto ditto	19	11	3	
Paid for Binding Books,	27	4	0	
Paid Messrs. Thacker and Co., and Ostell and Lepage, for Books purchased,	129	4	0	
				<u>486 8 7</u>

BY ORIENTAL PUBLICATIONS.

Paid Establishment for Oriental Works for October and November 1846,	136	0	0	
Paid Moulvee for Copying the Arabic Work Nubaruck Phaak Sharah Kunzoot Doocaak for November 1846,	4	0	0	
Paid Persian Writer's Salary,	6	0	0	
				<u>146 0 0</u>
Carried over,	3,112	1	8	

Brought forward, Co.'s Rs. 2,296 6 6

TO CONTRIBUTIONS AND ADMISSION FEES.

Received from Members from 16th November to 31st

December, 1846, 336 0 0

336 0 0

TO COMPANY'S PAPER.

Received by sale of the following 5 per Cent. Government Promissory Notes—

No. 1576 of 1829-30 for Sa. Rs. 1,500, Nett Co.'s Rs. 1,605 10 6
 No. 1421 of 1829-30 for ditto, 2,500 ditto ditto... 2,693 5 0
 No. 3743 of 1207 of 1841-42, for Co.'s Rs. 5,000 do. 5,116 10 8

9,415 10 2

TO BALANCE.

Received from the late Accountant, Mr. W. H. Bolst, the amount balance of Cash in his hands as per account closed on the 16th November, 1846, and deposited in the Bank of Bengal,.....

1,309 12 9

1,309 12 9

Company's Rupees,....

13,357 13 5

Calcutta, Asiatic Society's Rooms, }
 the 31st December, 1846.

E. and

Report.

XXV

Brought forward, Co.'s Rs. 3,112 1 8

BY SECRETARY'S OFFICE.

Paid Mr. H. Piddington, as Sub-Secretary, arrears of his Salary in full,	200 0 0	
Paid Mr. J. Muller's Salary as accountant for 15 days of November 1846, at 60 Rs. per month,	30 0 0	
Paid Establishment for November 1846,.....	20 10 0	
Paid sundry petty expenses 1-4, Postage 2-12,	4 0 0	
Paid for Stationery, :.....	17 12 9	
Paid for binding Books,	6 8 0	
	<hr/>	278 14 9

BY JOURNAL.

Paid Rev. J. Thomas, Baptist Mission Press, for printing charges down to July, 1846,	418 0 0	
Paid Messrs. P. S. De Rozario and Co. for Lithographing 525 Copies of a Drawing,	18 0 0	
Paid Rev. A. W. Street, Bursar, Bishop's College, for printing charges in full of his account,.....	5,804 7 0	
	<hr/>	6,240 7 0

BY MISCELLANEOUS.

Paid Agent to the Agra Bank Interest on a Bill for Co.'s Rs. 1,368 8 9 on account Portrait of W. W. Bird, Esq.	1 14 3	
Paid Rev. A. W. Street sundry printing charges, ...	63 4 0	
Paid for renewing two pieces of Company's Papers, ..	2 0 0	
Paid for Sundries on account meeting of the 2nd December 1846,	5 10 6	
Paid Messrs. P. S. De Rozario and Co. for Lithographing 500 Copies of a Circular,	15 0 0	
	<hr/>	87 12 9

BY PORTRAIT OF HONORABLE W. W. BIRD, ESQ.

Paid J. R. Neilson, Esq. Agent Agra and United Service Bank, per Messrs. W. H. Allen and Co. Draft at 30 days sight,	1,368 8 9	
	<hr/>	1,368 8 9

BY BALANCE.

In the Bank of Bengal,.....	2,037 15 0	
Cash in hand,.....	232 1 6	
	<hr/>	2,270 0 6
		<hr/>
Company's Rupees,....	13,357 13 5	
	<hr/>	

O. E.

FRED. GREENWAY,
Officiating Accountant.

Dr.

Abstract Statement of Cash Receipts and

RECEIPTS.

To MUSEUM.

Received from the General Treasury the amount of allowance authorized by the Court of Directors for the services of a Curator for 12 months, at 250 Rs. per month,.....	Rs.	3,000	0	0
Ditto for preparation of specimens at 50 ditto		600	0	0
Received by fines,		6	7	9
Received by sale of empty bottles,		3	0	6
				<u>3,609 8 3</u>

To MUSEUM ECONOMIC GEOLOGY.

Received from the General Treasury, the amount of allowance granted by Government for the services of a Joint-Curator for 12 months, at 250 Rs. per month,		3,000	0	0
Ditto ditto for Establishment and contingencies for ditto, at 64 Rs. per ditto,		768	0	0
Ditto ditto for four Glass Cases,		296	0	0
				<u>4,064 0 0</u>

To LIBRARY.

Received by Sale of Books,		236	0	0
Received fine from Frash's Salary,		0	8	0
Received by sale of a Packing Case,.....		6	0	0
				<u>242 8 0</u>

To ORIENTAL PUBLICATIONS.

Received from the General Treasury the amount of Grant from Government for 12 months, at 500 Rs. per month,.....		6,000	0	0
Received by sale of Oriental Works,		500	8	0
Received from the General Treasury anticipated Interest on a new 5 per Cent. Loan for Co.'s Rs. 1,500, from 29th January to 29th June 1847,		31	7	4
Ditto 1,000, from 27th to 30th December 1847, at 5 per Cent.....		0	6	8
				<u>6,532 6 0</u>

Carried over, 14,448 6 3

Disbursements of the Asiatic Society, for the year 1847.

Cr.

DISBURSEMENTS.

BY MUSEUM.

Paid Mr. E. Blyth's Salary as Curator for 12 months, at 250 Rs. per month,	3,000	0	0
Ditto house-rent at 40 Rs. per ditto, ..	480	0	0
Ditto in full of the arrears of his Salary from 1st May 1844 to October, 1846, at 100 Rs. per month,	3,200	0	0
			<u>6,680 0 0</u>
Paid Establishment of Taxidermists, Artists, Carpen- ters, &c., for 12 months,	1,750	0	0
Paid Contingencies,	793	7	3
Paid Mr. Holquett for proceeding to Dargeeling,	70	0	0
Paid for a Glass Case for depositing Shells,	70	7	6
			<u>9,363 14 9</u>

BY MUSEUM ECONOMIC GEOLOGY.

Paid Mr. H. Piddington's Salary as Joint-Curator for 12 months, at 250 Rs. per month,	3,000	0	0
Paid Establishment for ditto at 31 Rs. per ditto,	372	0	0
Paid Contingencies for ditto,	149	13	0
Paid for 4 Glass Cases granted by Go- vernment for the use of the Museum, 296 0 0	296	0	0
Less paid on the 24th November, 1846, 80 0 0	80	0	0
			<u>216 0 0</u>
			<u>3,737 13 0</u>

BY LIBRARY,

Paid Babu Rajendra Lall Mitter's Salary as Assistant Secretary and Librarian for 12 months, at 100 Rs. per month,	1,200	0	0
Paid Establishment for ditto,	702	13	10
Paid Contingencies for ditto,	88	10	0
Paid Messrs. Thacker and Co., and Ostell and Lepage, &c., for purchase of Books,	772	6	0
Paid Freight and sundry charges on Books, Parcels, &c.,	73	15	0
Paid for binding Books,	133	6	6
Paid for 2 dozen of Toon Wood Chairs,	45	0	0
			<u>3,016 3 4</u>

BY ORIENTAL PUBLICATIONS.

Paid Establishment for Oriental Works for 12 months,	849	1	7
Paid Contingencies,	5	12	3
Paid Dr. J. Hæberlin, for 100 Copies of Sanscrit An- thology,	800	0	0
Paid for the purchase of sundry Oriental Works,	125	0	0
Paid for Copying the Arabic Work Naharal Plaik, &c.	4	0	0
Paid for binding Oriental Works,	97	12	0
Paid for the purchase of the following new 5 per Cent. Government Loans :—			
No. 18878 for Co.'s Rs. 1,500, 1,500 0 0	1,500	0	0
No. 4140 of 22567 ditto, 500, 488 7 6	488	7	6
No. 19620 ditto,	1,000	1,008	10 7
1 Piece ditto ditto,	1,000	1,000	0 0
			<u>3,997 2 1</u>

Carried over, 5,878 11 11 16,117 15 1

Brought forward, 14,148 6 3

To JOURNAL.

Received by sale of the Asiatic Society's Journal,	404 8 0	
Received from the Bank of Bengal per a cheque on account Journal,	400 0 0	
	<u> </u>	804 8 0

To COMPANY'S PAPER.

Received by sale of the following 5 per Cent. Government Loans :—

No. 1208, dated 30th June, 1841, for Co.'s Rs.	1,800 0 0
No. 3744 of 1207, ditto ditto	2,000 0 0

3,800 0 0

Interest from 30th June to 14th July 1847, being 15 days, at 5 per Cent... 7 14 8

3,807 14 8

Less Discount on Rs. 3,807 14 8, at 2-4 per Cent. 85 10 9

3,722 3 93,722 3 9Carried over, 18,975 2 0

Brought forward,	5,878	11	11	16,117	15	1
Paid fee for renewing 1 Piece Company's Paper,	1	0	0			
Paid Dr. E. Roer, Co-Secretary Oriental Department, his Establishment and Contingencies for the publication of the Vedas for 7 months,	330	9	1			
Paid to the Sub-Treasurer for 2 Drafts on the Collector of Benares in favour of G. Nicholls, Esq., Head Master Benares College, being the amount disbursed by him on account of the publication of the Vedas,	119	9	0			
				<u>6,329</u>	11	0

BY JOURNAL.

Paid Mr. J. C. Sherriff, account Bishop's College Press, for printing the Society's Journal, down to May, 1846,	1,078	4	0			
Paid Mr. J. Thomas, acct. Baptist Mission Press, from September 1846, down to June 1847,	1,788	0	0			
Paid Mr. Thomas Black, for Lithographing and printing,	775	11	1			
Paid Mr. J. Bennett, for printing and coloring Drawings,	262	0	0			
Paid Mr. J. Hume, Proprietor Star Press, for Lithographing, &c.	76	6	0			
Paid Mahindi Sircar, for Lithographing, &c.	70	14	0			
Paid Mr. J. Hendrie, for coloring Drawings,	111	0	0			
Paid Contingencies,	62	2	3			
				<u>1,224</u>	5	4

BY MISCELLANEOUS.

Paid James Broderick's Salary as Night Guard for 26 days of November and for December, 1846, at 40 Rs. per month,	74	10	9			
Paid Mr. Halligan, ditto for 21 days of July, 1847,	28	0	0			
Ditto from February to November, 1847, ditto,	400	0	0			
				<u>502</u>	10	9
Paid Salaries of 2 Chowkeedars, &c., from the 10th to the 30th November, 1846,	10	1	3			
Paid for a Canvas Screen,	12	3	0			
Paid Mr. J. Muller, for a set of Bills of Exchange on Messrs. Sinclair, Hamilton and Co. London, in favour of W. Neal, Esq., Collector Oriental Translation Fund, at 30 ds. for £10 10 0, being the amount of Subscription for the year 1846,	112	0	0			
Paid for Advertizing Meeting in the <i>Englishman</i> newspaper,	3	0	0			
Paid sundry Contingent expenses incurred for the Meetings, and Oil for Night Guard, &c.	95	2	0			
Paid for 10 Pieces of Gurra Cloth for the Committee Room,	15	0	0			
Paid Mr. J. Chance, winding and keeping the Clock in order,	25	0	0			
Paid Proprietor <i>Englishman</i> Press, for Lithographing 200 copies of a Circular,	11	8	0			
Paid Messrs. P. S. De Rozario and Co., for printing 1,500 Receipts and 1,000 Bill Heads,	75	0	0			
				<u>861</u>	9	0
Carried over,	26,672	2	5			

Brought forward, 18,975 2 0

TO CONTRIBUTIONS AND ADMISSION FEES.	
Received from Members during the twelve months, ..	9,601 13 6
Deduct amount of admission fee, refunded to Messrs. Mackintyre and Co., on account Captain J. D. Cun- ningham, being received twice,.....	32 0 0
	<hr/> 9,569 13 6

TO BALANCE	
As per Account closed on the 31st December, 1846,..	2,270 0 6

Company's Rupees,....	<hr/> 30,815 0 0
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E. and

*Calcutta, Asiatic Society's Rooms, }
the 31st December, 1847.*

Report.

xxxi

Brought forward,	861	9	0	26,672	2	5
Paid Advertizing charges,	3	0	0			
Paid Discount on a Treasury Draft,	0	1	5			
	<hr/>			864	10	5

BY SECRETARY'S OFFICE.

Paid Mr. J. Muller, accountant, his Salary from December, 1846, to September, 1847, at 60 Rs. per month,	600	0	0			
Paid Mr. F. Greenway, Officiating Accountant, his Salary for October and November, 1847, at ditto,	120	0	0			
	<hr/>			720	0	0
Paid Establishment for 12 months,	391	9	3			
Paid for Stationery, and a Stationery Case for Secretary's use,	53	4	6			
Paid Contingencies,	90	11	3			
	<hr/>			1,255	9	0

BY BUILDINGS.

Paid Workmen for repairing Bearer's Lodging,	3	0	0			
	<hr/>			3	0	0

BY MINERALOGICAL AND GEOLOGICAL MUSEUM.

Paid Contingencies for 12 months,	41	9	9			
Paid Cart hire for Minerals forwarded by Col. J. R. Ousely, Chota Nagpoor,	12	0	0			
Paid for 1 Second hand Glass Case,.....	14	1	6			
	<hr/>			67	11	3

BY THE HONORABLE THE COURT OF DIRECTORS.

Paid for Casks and packing Cases for Specimens,	18	0	0			
	<hr/>			18	0	0

BY PORTRAIT OF H. T. PRINSEP ESQ.

Paid Messrs. Lyall Matheson and Co., freight for a Case from London, addressed "H. T. Prinsep's Testimonial,"	20	0	0			
	<hr/>			20	0	0

BY SIR A. BURNES' DRAWINGS.

Paid Mrs. A. M. Ballin, for printing and coloring Drawings,	1,001	15	0	1,001	15	0
	<hr/>			29,903	0	1

BY BALANCE.

In the Bank of Bengal,.....	682	14	6			
Cash in hand,.....	179	1	5			
	<hr/>			861	15	11

BY INEFFICIENT BALANCE.

For amount advanced Mr. Templeton, on the 7th Instant on a petty charges in the Museum and Zoology Department,.....	50	0	0			
	<hr/>			911	15	11

Company's Rupees,.... 30,815 0 0

and O. E.

FRED. GREENWAY,
Officiating Accountant.

Dr.	<i>The Oriental Publication Grant in</i>			
Jan. 7th. 1847.—To Cash paid Establish- ment for Oriental Works for Dec. 1846,	66	6	4	
Ditto ditto Petty charges for ditto,	4	15	6	
			<u>71</u>	5 10
Ditto 29th ditto ditto G. Udny, Esq. Sub-Treasurer as Contribution for a new 5 per cent. Government Loan No. 18878 of 1841-42 dated 30th June 1841, for Co.'s Rs.			<u>1,500</u>	0 0
				1,571 5 10
February 3d ditto ditto Moulvee Golam Hydur for the following Books purchased from him :				
4 Vol. Shahnamah at 10 per vol.	40	0	0	
4 ,, Gunhoobee at 6-8 ditto,	26	0	0	
4 ,, Arbee Akhwan Oossuffa at 5 ditto,	20	0	0	
4 ,, Oordoo ditto at 6 per vol.....	24	0	0	
			<u>110</u>	0 0
Ditto 12th ditto ditto Dr. J. Hæberlin, for 100 copies of Sanscrit Anthology,			800	0 0
Ditto 15th ditto ditto Establishment for Oriental Works for January 1847,			62	0 0
				<u>972 0 0</u>
March 13th ditto ditto Duftry for binding 2 vols. Panini Grammar,	1	8	0	
Ditto ditto Establishment for Oriental Works for February 1847,	69	2	3	
			<u>70</u>	10 3
				70 10 3
April 14th ditto ditto Establishment for Oriental Works for March 1847,			72	0 0
Ditto 17th ditto ditto Duftry for binding Oriental Works,			7	12 0
Ditto 29th ditto ditto for copying the Arabic Work Naharal Phaik, &c.....			4	0 0
				<u>83 12 0</u>
May 10th ditto ditto for the purchase of a copy of the first 4 Books of the Yajur Vedo Brahmana,			12	0 0
Ditto 12th ditto ditto Sheriet Woollah Duftry for bind- ing Oriental Works,			3	0 0
Ditto 21st ditto ditto Establishment for Oriental Works for April 1847,			75	9 0
				<u>90 9 0</u>
June 8th ditto ditto for the purchase of a new 5 per Cent. Loan No. 4140 of 22567 for Co.'s Rs.	500	0	0	
Less Anticipated Interest from 8th to 29th June 1847 being 22 ds. at 5 per Cent,.....	1	8	6	
Discount at 2 per Cent.....	10	0	0	
			<u>11</u>	8 6
				488 7 6
Ditto 11th ditto ditto fee for renewing Co.'s Paper, No. 4140 of 22567,			1	0 0
Ditto 16th ditto ditto Dr. E. Roer Co-Se- cretary Oriental Department salary of 2 Pundits from 10th to 31st May 1847, employed for the publication of Vedas,..	24	13	7	
Ditto ditto Stationary for ditto,	9	11	6	
			<u>34</u>	9 1
				524 0 7 2,788 5 1
			Carried over,	

Account Current with the Asiatic Society.

By Cash received from the Sub-Treasurer the amount of Monthly grant sanctioned by the Court of Directors, from November 1846 to October 1847, being 12 Months @ 500 per Month,.....	6,000 0 0		6,000 0 0
Ditto ditto Anticipated interest on a new 5 per Cent. Loan No. 18878 of 1841-42 for Co.'s Rs. 1,500 from 29th January 1846, 29th June 1847, @ 5 per Cent.	31 7 4		31 7 4

Carried over, 6,031 7 4

	Brought forward,	524	0	7	2,788	
June 17th, 1847.—To	Cash paid for binding 4 vols.					
	Mahavarut,.....	24	0	0		
Ditto 19th ditto ditto	Establishment for Oriental Works for May 1847,	72	0	0		
		<hr/>			620	0 7
July 5th ditto ditto	Dr. E. Roer, Co-Secretary Oriental Department, salary and Boat hire of 2 Pundits employed for the Publication of Vedas, for June 1847,	43	0	0		
Ditto 10th ditto ditto	Sheriet Woollah Duftry for binding Oriental Works,	5	8	0		
Ditto 28th ditto ditto	Establishment for Oriental Works for June 1847,	72	0	0		
		<hr/>			120	8 0
August 7th ditto ditto	Dr. E. Roer, Co-Secretary Oriental Department, salary of 2 Pundits, 1 Writer, and a Peon employed for the publication of Vedas, including Boat hire, for July,	52	0	0		
Ditto 19th ditto ditto	Establishment for Oriental Works for July 1847,	72	0	0		
		<hr/>			124	0 0
Sept. 6th ditto ditto	Allum Duftry for Paper,	0	12	9		
Ditto 7th ditto ditto	Dr. E. Roer, Co-Secretary Oriental Department, salary of 2 Pundits, 1 Writer, and a Peon employed for the Publication of the Vedas, and Boat hire for August 1847,	52	0	0		
Ditto 8th ditto ditto	G. Udney, Esq. Sub-Treasurer, for a Draft on the Collector of Benares in favor of G. Nichols, Esq. Head Master, Benares College, being the amount of expenses incurred by him for the Publication of Rik Veda,	69	12	0		
Ditto ditto ditto	Premium on ditto,.....	1	0	0		
		<hr/>			70	12 0
Ditto 16th ditto ditto	Premium for a new 5 per Cent Loan No. 19620 of 1841-42 dated 30th June 1841,	1000	0	0		
Interest from 30th June to 15th Sept. 1847 being 2 Months and 16 days at 5 per Cent.		10	8	11		
		<hr/>			1,010	8 11
Less Discount at 3 as. per Cent,		1	14	4		
		<hr/>			1,008	10 7
Ditto 18th ditto ditto	Establishment for Oriental Works for August 1847,	72	0	0		
Ditto 27th ditto ditto	G. Udney, Esq. Sub-Treasurer for a Draft on the Collector of Benares in favor of G. Nichols, Esq. Head Master Benares College, being the amount disbursed by him on Account of the Publication of Rik Veda,	47	13	0		
Ditto ditto	Premium on ditto,	1	0	0		
		<hr/>			48	13 0
		<hr/>			1,253	0 4
	Carried over,	<hr/>			4,905	14 0

Report.

XXXV

Brought forward, 6,031 7 4

Carried over, 6,031 7 4

	Brought forward,	4,905	11	0
Oct. 1st, 1847.—To Cash paid Dr. E. Roer Co-Secretary Oriental Department Salary of 2 Pundits, 1 Writer, and a Peon employed for the Publication of Vedas, and contingent expenscs, for September 1847,		53	0	0
Ditto 6th ditto ditto Establishment for Oriental works for September 1847,		72	0	0
Ditto 13th ditto ditto Sheriet Woollah Duftry for binding Oriental Works,	10	4	0	
Ditto ditto ditto Shabash Khan ditto,	6	0	0	
		16	4	0
Ditto 30th ditto ditto for the purchase of a Copy of Betallee pachise,		3	0	0
			111	4
November 1st ditto Dr. E. Roer, Co-Secretary Oriental Department Salary of 2 Pundits, 1 Writer, and a Peon employed for the publication of the Vedas, for October 1847,		52	0	0
Ditto 18th ditto ditto Establishment for Oriental Works for October 1847,		72	0	0
Ditto 27th ditto ditto Duftry for binding Oriental Works,		39	12	0
			163	12
			5,213	14
To Balance Cash,		817	9	4
Amount of the following new 5 per Cent. Government Loans purchased as above and deposited with the Government Agent.				
No. 18,878 of 1841-42,	1,500	0	0	
No. 4,140 of 22,567 of ditto, ..	500	0	0	
No. 19,620 of 1841-42,	1,000	0	0	
		3,000	0	0
			3,817	9
			9,031	7
			4	
			Co.'s Rs...	4
December 10th.—To Cash paid Dr. E. Roer, Co-Secretary Oriental Department Salary of 2 Pundits and 1 Peon and Boat hire for November,		44	0	0
Ditto 15th ditto Establishment for Oriental Works for November,		72	0	0
Ditto 27th ditto Sub-Treasurer, Contribution for a new 5 per Cent. Government Loan,	1,000	0	0	
			1,116	0
Ditto 31st—To Balance.				
Company's Paper 5 per Cent. of 1841-52 for,	4,000	0	0	
Cash,	202	0	0	
			4,202	0
			5,318	0
			Co.'s Rs...	0

E. E.

Calcutta, Asiatic Society's Room, }
the 31st December 1847. }

	Brought forward,	6,031	7	4
By amount of 5 per Cent. Government Loans purchased during the year as per Contra,		3,000	0	0
		<hr/>		3,000 0 0

Co.'s Rs... 9 031 7 4

Calcutta, 30th Nov. 1847.

December—By Balance brought down—				
Company's Paper,.....	3,000	0	0	
Cash,	817	9	4	
		<hr/>		3,817 9 4
Ditto 15th ditto—Cash received from the General Treasury, amount of Monthly grant sanctioned by the Court of Directors, for Nov. 1847,	500	0	0	
Ditto 28th ditto ditto anticipated interest on a 5 per Cent. loan for 1,000 Rs. from 27th to 30th December 1847,	0	6	8	
		<hr/>		500 6 8
Ditto 31st—By amount of a new 5 per Cent. Government loan as per Contra,.....		1,000	0	0
		<hr/>		5,318 0 0
		<hr/>		Co.'s Rs... <u>5,318 0 0</u>

*Abstract Statement of Oriental and other Publications, &c., sold from
the 1st of December, 1846, to the 30th of November, 1847.*

Dr.

ORIENTAL PUBLICATIONS.

Fatawe Alumgiri, Vol. I. 3 copies, Vol. II. 3 copies, Vol. III. 5 copies, Vol. IV. 7 copies, Vol. V. 7 copies, Vol. VI. 7 copies, at Rs. 8 per Vol.	Rs.	256	0	0	
Inayah, 3 vols,		24	0	0	
Istallahat e Sufia, 2 copies,		10	0	0	
Sharah ul Islam, 4 copies,		32	0	0	
Anis ul Masharraheen, 1 copy,.....		5	0	0	
Jwame ul Ilm ul Riazi, 1 copy,		4	0	0	
Khazanat ul Ilm, 2 copies,		16	0	0	
Tarikh e Nadiri, 6 copies,.....		48	0	0	
Mahábhárata, 17 vols.		180	0	0	
Index to ditto, 20 vols.....		30	0	0	
Shusruta, Vol. I. 7 copies, Vol. II. 8 copies,.....		60	0	0	
Naishadha, 7 copies,.....		42	0	0	
Harivansa, 5 copies,.....		25	0	0	
Rájatarangini, 1 copy,		5	0	0	
Tibetan Grammar, 2 copies,.....		16	0	0	
Tibetan Dictionary, 2 copies,		20	0	0	
			773	0	0

JOURNAL.

Journal of the Asiatic Society, 24 vols. and 146 Nos.	607	8	0
Gleanings in Science No. 3, 1 copy,	1	8	0
Notices and Descriptions of various New or Little known Species of Birds, 16 pamphlets,	6	12	0
			615 12 0
Asiatic Researches, 19 vols. and 3 parts,	205	0	0
			205 0 0

MISCELLANEOUS.

English Catalogue, 1 copy,	1	0	0
Persian Catalogue, 2 copies,.....	2	0	0
Sanskrita Catalogue, 1 copy,	1	0	0
Points in the History of the Greek and Indo-Scythian Kings, 2 copies,.....	10	0	0
			14 0 0
Carried over.	14	0	0 1,593 12 0

	Brought forward,	14	0	0	1,593	12	0
Leech's Grammar of the Punjābi Languages, 2 copies,		2	0	0			
Han koong Tseu, or the Sorrows of Han, 2 copies,		3	0	0			
Memoirs of the Emperor Jehangeer, 3 copies,		12	0	0			
Travels of Ibn Batuta, 1 copy,.....		6	0	0			
Travels of Makarius, 1 copy,		4	0	0			
Institutiones Pracriticæ, 1 copy,.....		4	0	0			
Gita Gobinda, 4 copies,		10	0	0			
Histoire des Rois de Kachmir, 1 copy,		14	0	0			
Yajna datta badha, 2 copies,.....		7	0	0			
Essai sur les Pali, 1 copy,		3	0	0			
Memoire sur deux Inscriptions Cunéiformes, 1 copy,		3	0	0			
Elémens de la Grammaire Japonaise, 1 copy,.....		4	0	0			
History of the Afghans, 1 copy,		5	0	0			
Moorcroft's Travels, 1 copy,		12	0	0			
Commentaire sur le Yucna, 1 copy,.....		10	0	0			
						<u>113</u>	<u>0 0</u>

Total,..... Co.'s Rs. 1,706 12 0

Cr.

18th Dec. 1846, to 13th Augt. By Cash paid to J. ^r Muller,							
Esq. Acct. Asiatic Society,	450	0	0				
17th Sept. to 22d Nov. 1847. Ditto ditto F. Greenway,							
Esq. Offg. Acct. As. Soc.....	467	8	0				
						<u>917</u>	<u>8 0</u>
By Outstanding Bills,						789	4 0
						<u>1,706</u>	<u>12 0</u>

Total,..... Co.'s Rs. 1,706 12 0

E. E.

RAJENDRALAL MITTRA.

Asiatic Society, 15th Dec. 1847.

LIST OF SUBSCRIBING MEMBERS.

- | | |
|--|---|
| <p>Abbott, Capt. J.
 Anderson, Major W.
 Avdall, J. Esq.
 Batten, J. H. Esq.
 Baker, Major W. E.
 Barlow, Sir R.
 Beaufort, F. L. Esq.
 Beckwith, J. Esq.
 Benson, Lieut.-Col. R.
 Birch, Lieut.-Col. R. J. C.
 Birch, Major W. F.
 Blgrave, Lieut. T. C.
 Bogle, Major A.
 Bowring, L. R. Esq.
 Brandreth, J. E. L. Esq.
 Briggs, Lieut. D.
 Brodie, Capt. F.
 Broome, Capt. A.
 Buckland, C. T. Esq.
 Bushby, G. A. Esq.
 Cameron, Hon'ble C. H.
 Campbell, A. Esq.
 Cheape, G. C. Esq.
 Christopher, A. Esq.
 Colvile, J. Esq.
 Colvin, B. J. Esq.
 Colvin, J. R. Esq.
 Corbyn, F. Esq.
 Cunningham, Capt. J. D.
 Currie, E. Esq.
 Cust, R. N. Esq.
 Dalton, Lieut. E. T.
 Davidson, T. R. Esq.
 Debendranath Tagore, Baboo.
 Dirom, W. M. Esq.
 Dodd, J. Esq.
 Douglas, Lieut. C.
 Dunlop, A. C. Esq.
 Dwarkanath Bose, Baboo.
 Earle, W. Esq.
 Edgeworth, M. P. Esq.
 Elliot, H. M. Esq.
 Elliott, J. B. Esq.
 Elliott, W. Esq.</p> | <p>Forbes, Col. W. N.
 French, G. W. Esq.
 Frith, R. W. G. Esq.
 Frith, W. H. L. Esq.
 Furlong, J. Esq.
 Gibelin, Mons. E.
 Gilmore, A. Esq.
 Gladstone, M. Esq.
 Goodwin, Major H.
 Grant, Sir J. P.
 Grant, W. P. Esq.
 Grant, J. W. Esq.
 Greenway, Wm. Esq.
 Grey, W. Esq.
 Hæberlin, Dr. J.
 Hall, F. E. Esq.
 Hannay, Capt. S. T.
 Hanyngton, Capt. J. C.
 Hay, Lord Arthur.
 Hardinge, Hon'ble C. S.
 Hurimohun Sen, Baboo.
 Henry, Dr. W.
 Heatly, S. G. T. Esq.
 Hill, G. Esq.
 Hodgson, Major Genl. J. A.
 Hodgson, B. H. Esq.
 Hopkinson, Capt. H.
 Hough, Dr. H. F.
 Houston, R. Esq.
 Hume, J. Esq.
 Jackson, W. B. Esq.
 Jameson, W. Esq.
 Jenkins, Major F.
 Jerdon, T. C. Esq.
 Jones, R. Esq.
 Johnston, J. Esq.
 Karr, W. Seton, Esq.
 Keane, Rev. W.
 Kerr, J. Esq.
 Kittoe, Capt. M.
 Knighton, W. Esq.
 Lackersteen, Count J.
 Laidlay, J. W. Esq.
 Lamb, Dr. G.</p> |
|--|---|

- Latter, Capt. T.
 Lawrence, Col. H. M.
 Linstedt, E. Esq.
 Loch, G. Esq.
 Logan, J. R. Esq.
 Low, Col.
 Lushington, G. T. Esq.
 Lushington, E. H. Esq.
 Mackey, D. C. Esq.
 Maddock, Sir T. H.
 Manuckjee Rustomjee, Esq.
 McLeod, Capt. W. C.
 McLeod, D. F. Esq.
 McKenzie, J. Esq.
 McKilligan, J. P. Esq.
 McQueen, Rev. J.
 Middleton, J. Esq.
 Mill, J. B. Esq.
 Mitchell, A. Esq.
 Money, D. C. Esq.
 Montague, J. Esq.
 Muir, J. Esq.
 Muller, J. Esq.
 Newmarch, J. Esq.
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JOURNAL
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JANUARY, 1848.

Memoir upon the Quantity of Iron necessary in a Tension Chain Bridge.—By Rev. J. H. PRATT.

To demonstrate, that the QUANTITY OF IRON in a Suspension Bridge, necessary to enable each part to sustain the greatest tension to which it will be subjected when the road-way is loaded to the greatest extent, IS ALTOGETHER INDEPENDENT of the FORM of the bridge, HOWEVER COMPLICATED THAT FORM MAY BE, and depends solely upon the width of the bridge, the height of the piers above the road-way, the thickness of the first link in leaving each pier, and the angle that link makes with the horizon.

In the controversy recently mooted in India regarding the superiority or inferiority of Taper-Chains in the construction of Suspension Bridges, when compared with uniform or common-chains, the consideration of the Quantity of Metal employed is one of considerable practical importance. According to the remarkable property which we have above enunciated, and shall soon proceed to demonstrate, the Quantity of Iron actually necessary to resist the strains is IN THEORY the same for all forms and positions of chain and suspending rods. But this property points out to us, that in the ACTUAL CONSTRUCTION of Bridges the quantity of metal employed will be greater in proportion to the greater variety of strain. For there would always be a practical

difficulty in the way of making every portion of iron in a complicated structure *exactly proportional* to the tensions, and no portion must be *thinner*, otherwise the loaded bridge would be in danger of falling, and therefore the probabilities are that many parts would be *thicker* than absolutely necessary. And therefore, as we have said, the economy of iron will be practically greatest in bridges where the varieties of tension are least. This tells, then, in a practical point of view against the Taper-Chain system in the question Taper-chain *versus* Common-chain bridge.

We shall now proceed to the demonstration of the property enunciated, first, however, proving the following lemma which we shall find of use in the course of our investigation.

Suppose, in the first instance, that the bridge is as is represented in fig. 1. This is given as a simple case to which we shall refer subsequently as a standard. The road-way is supported by two rods AB , AB , proceeding from the piers, and attached to the road-way at B and B . The tensions of these rods will not only support the weight of the loaded road-way, but will produce a tension in the line BB , which must be provided for by inserting a rod of iron, BB , of a proper thickness, i. e. proportional to this horizontal tension, to prevent the suspending rods from *tearing* the road to pieces. The rods AB , AB must be held down by bolts, as shown in the diagram. Let C be the middle point between B and B : and Cb be drawn perpendicular to AB produced.

LEMMA.—*The quantity of iron in AB and BC necessary to resist the strains is equal to a bar of the thickness at A , and of the length Ab .*

Draw CD perpendicular to BC and meeting AB produced in D .

The tension of BA at B is balanced by two forces, (1) the tension of BC , and (2) the portion of the weight sustained, acting in BW .

The triangle BCD has its sides parallel to the directions of these forces, and these sides are therefore proportional in magnitude to the three forces.

$$\begin{aligned} \text{Hence, tension of } BC &= \frac{BC}{BD} \times \text{tension of } BA \\ &= \frac{Bb}{BC} \times \text{tension of } BA, \end{aligned}$$

since the triangle BbC is similar to the triangle BCD .

But the transverse section of iron is to be proportional to the tension. Hence

$$\text{Section of } BC = \frac{Bb}{BC} \times \text{section of } BA.$$

$$\begin{aligned} \therefore \text{Quantity of iron in } BC &= BC \times \text{section of } BC \\ &= Bb \times \text{section of } BA. \end{aligned}$$

Hence the quantity of iron in AB and BC together $= AB \times$ section of $AB + Bb \times$ section of $AB = Ab \times$ section of $AB =$ quantity in a bar of length Ab , and thickness at A .—Q. E. D.

We shall now proceed to give, first a Geometrical, and then an Analytical demonstration of the Fundamental Proposition which is the subject of this communication.

1. GEOMETRICAL DEMONSTRATION.

Let fig. 2 represent the bridge, the dark lines representing the iron work. The lower parts EB, BC of the rods in fig. 1 are removed, and replaced by EF, FC , and EG, GC , on both sides the bridge: the rod FC is necessary to counteract the horizontal strain of FE , and the rod GC is necessary to hold down EG , EG in position.

We have to show, that if these four new rods are proportional, in transverse section, to their strains, the quantity of iron in them is the same as in those which they replace, viz. in EB, BC .

Draw Ch perpendicular to EF produced, and Cg perpendicular to EG produced. Then, by the property already proved in case of fig. 1, the quantity of iron in EF and $FC =$ quantity in a length Ch of same section as EF , and the quantity of iron in EG and $\frac{1}{2} GC^* =$ the quantity in a length Cg of the same section as EG . Now the tensions of EA, EF , and EG acting at E are in equilibrium. Draw the parallelogram JH . Hence the sides of the triangle BHE (as also of EJB), being parallel to the directions of these three forces, are proportional also to them in magnitude.

* The other half of GC 's substance belongs to the other half of the bridge.

Hence tension of $EF =$ tension of $EA \times \frac{EH}{EB}$

\therefore section of iron in $EF =$ section of $EA \times \frac{EH}{EB}$

Also tension of $EG =$ tension of $EA \times \frac{EJ}{EB}$

\therefore section of iron in $EG =$ section of $EA \times \frac{EJ}{EB}$

Hence the quantity of iron in $EF, FC, EG, GC =$ quantity in Eh and Eg

$= Eh \times$ section of $EF + Eg \times$ section of EG

$=$ section of $EA \left\{ \frac{Eh \times EH + Eg \times EJ}{EB} \right\}$

But by a property, (which we shall prove below, and which we defer at present in order not to interrupt this demonstration)—

If EH, EJ represent the magnitudes and directions of two forces of which the magnitude and direction of the resultant is EB , and from any point C perpendiculars be drawn upon these three directions, (produced if necessary,) as Ch, Cg, Cb : then $EH \times Eh + EJ \times Eg = EB \times Eb$.

This being assumed the calculation above gives—

Quantity of iron in $EF, FC, EG, GC = Eb \times$ section of EB
 $=$ quantity of iron in EB and BC .—Q. E. D.

We shall now demonstrate the property we have just assumed.

The lines in (fig. 3) are the same as in (fig. 2), except that in addition Hk, Jj , are drawn at right angles to EC and meeting EB in k' and j' . Now the triangles Ehk, ECh are similar.

$$\therefore EH : Ek :: EC : Eh$$

$$\therefore EH \times Eh = EC \times Ek.$$

So also from the similar triangles Ekk', Ebc we have

$$Ek : Ek' :: Eb : EC.$$

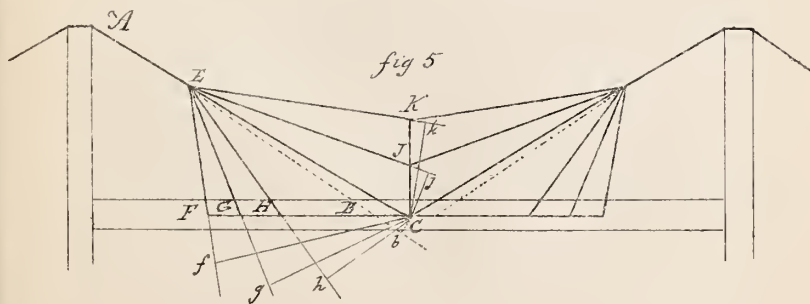
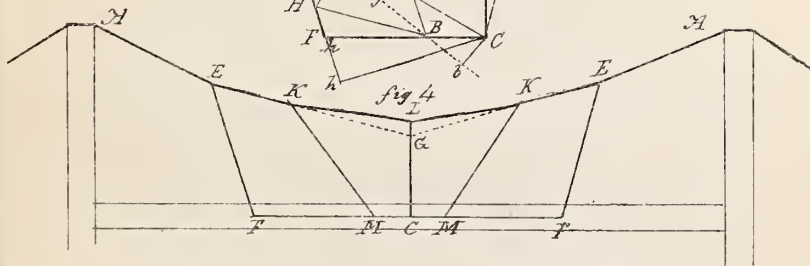
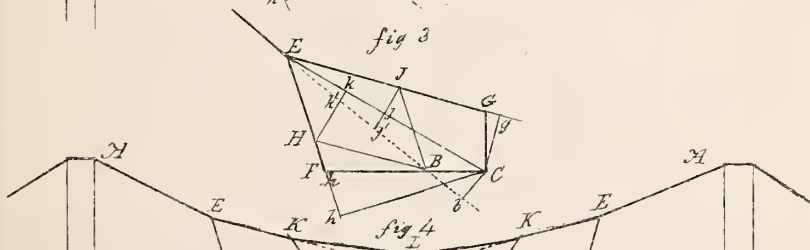
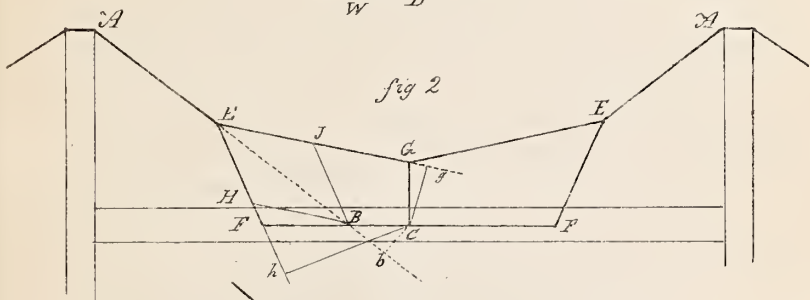
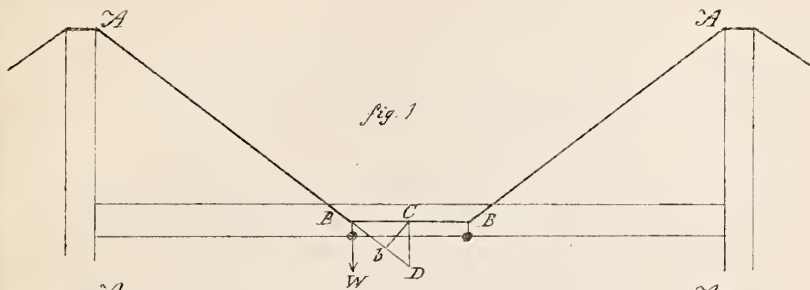
$$\therefore EC \times Ek = Eb \times Ek'.$$

$$\text{Hence } EH \times Eh = Eb \times Ek'.$$

In precisely the same manner

$$EJ \times Eg = Eb \times Ej'.$$

Now in the triangles Ehk', Bjj' the angles are equal, and $EH =$



BJ : hence the triangles are equal, and $\therefore Ek' = Bj'$.

$$\therefore Ek' + Ej' = Bj' + Ej' = BE.$$

Hence, then, from the above

$$EH \times Eh + EJ \times Eg = EB \times Eb. \text{---Q. E. D.}$$

We have thus proved the Proposition, which we began by enunciating, in the case represented in fig. 2. But the same is true in any other case. For (see fig. 4.) we may suppose the rods *KG, GC* taken away, and others *KM, MC, KL, LC* put in their place, and the reasoning will be precisely the same, and the result the same, however many subdivisions be made. And therefore the property is universally true.

The above demonstration is GEOMETRICAL only; but by the help of analysis we may give the following proof which at once applies to every case which can occur.

2. ANALYTICAL DEMONSTRATION.

Suppose *EB, BC* removed, and replaced by any number of rods *EF, FC; EG, GC; EH, HC; EJ, JC; EK, KC, &c.*

Let $\theta_1, \theta_2, \theta_3, \dots$ be the angles which *EF, EG, EH* make with *AB*.

$$\theta'_1, \theta'_2, \theta'_3, \dots \dots \dots EJ, EK, \dots \dots \dots$$

Let *S* be the transverse section of iron in *AB* :

$$S_1 S_2 S_3 \dots \dots \dots \text{ditto.. in } EF, EG, EH, \dots \dots \dots$$

$$S'_1 S'_2 S'_3 \dots \dots \dots \text{ditto.. } EJ, EK, \dots \dots \dots$$

Then, by hypothesis, $S S_1 S_2 S_3 \dots S'_1 S'_2 S'_3$, are proportional to the tensions of those rods.

Draw *Cf, Cg, Ch, Cb, Cj, Ck, ..* perpendicular to *EF, EG, EH, EB, EJ, EK, ..* Join *EC*. Let $EC = a$: and $BEC = d$.

Now because the tensions at *E* are in equilibrium ;

$$\therefore S = S_1 \cos \theta_1 + S_2 \cos \theta_2 + \dots + S'_1 \cos \theta'_1 + S'_2 \cos \theta'_2 + \dots$$

$$0 = S_1 \sin \theta_1 + S_2 \sin \theta_2 + \dots + S'_1 \sin \theta_1 - S'_2 \sin \theta'_2 - \dots$$

Then multiplying the first of these by $a \cos d$ and the second by $a \sin d$ and subtracting.

$$S \cdot a \cos d = S_1 a \cos (\theta_1 + d) + S_2 a \cos (\theta_2 + d) + \dots$$

$$+ S'_1 a \cos (\theta'_1 - d) + S'_2 a \cos (\theta'_2 - d) + \dots$$

$$\text{or } S \times Eb = S_1 \times Ef + S_2 \times Eg + \dots + S'_1 \times Ej + S'_2 \times Ek + \dots$$

or quantity of iron in *EB, BC* = quantity in *EF, FC; EG, GC, &c.*—Q. E. D.

If any of these bars be similarly subdivided the same is true; and the most complicated system we chose may thus be devised; but the same result is true.

N. B. The effect of the *weight* of the rods themselves has been neglected in these calculations; because it is always so small a quantity compared with the tension. A bar of iron one-square inch section will support 9 tons without stretching: the *weight* of one foot of such a bar is only 3.31 lbs., which equals .00148 of a ton, or .00016 of 9 tons, a fraction so small that it may be omitted. But the Proposition is nevertheless rigidly true even when the weight of the rods is taken into account.

PART II.—*The most ancient Grammar of the Vedas, or the “Prātiçākhyasūtren.”*

Translated from the German of Dr. Roth, by LUDWIG E. REES.

In the first treatise we spoke but in general terms of these writings. The following essay will dwell more particularly on them.

1. The Royal Library at Paris possesses (under No. 203 Devanāgari) a manuscript of the most extensive Prātiçākhyā (on 236 pages, *Samvat* 1751) with the following words at the end of each *Paṭala*: *iti-çri-pārshada-vyākhyâyâm Ananda-pura vāstavya vajrata-putra Uvata-kritau prāti-çākhyā-bhāshye, &c.* The same work is again found in a more ancient but more carelessly written copy in No. 28 of the East India House (204 pages ex codd. Colebr.) The sūtra text alone is again in No. 1355 (*Samvat* 1781, 24 double pages codd. Colebr.).

2. As to what regards the size, the Prātiçākhyā of the very careless manuscript No. 598, East India House, is greatly inferior (83 double pages, likewise from Colebrooke's Library.) This bad copy however appears to have been written after a correct MS., and on that account restitution may be made in almost all cases. At the end of the fourth and fifth Adhyāya it is entitled: “*ity ānanda-pura vāstavya Bhaṭṭa vajrata-patra ūvata-virachita-matrimodakākhye prātiçākhyā bhāshye,*” &c.

3. In the Bodleian Library at Oxford there are two manuscripts of a third work of this title. The first (17 double pages ex codd. Wilson) contains merely the text ; fol. 1—5 are wanting. The second (94 double pages, of which pages 1—22 are wanting ; also from Wilson's collection) gives both text and commentary, which last however does not appear to me to have been written by Uvaṭa. It bears the title : “*iti-tri-bhāshya-ratné prāṭiçākhyā-vivarāṇe,*” &c. Judging from this title it might be a compilation from three more ancient comments.*

Why the common title of these works can not be the original one, I have already mentioned above. But in the later Indian literature, it has been adopted, and in Madhusudana Sarasvatī's *Prasthānabheda*, an Encyclopedia of Indian Literature, it is mentioned in the following manner : *tatra sarvaveda-sādhāranī çikshā athaçikshā pravakshyāmity ādi panchakhandatmikā Pāninina prakāçitā ; Prāṭiçākhā cha bhinnar-ūpā, prāṭiçākhyā sāgnitā anyair eva munibhi : pradarcitā* (No. 2098, E. Ind. H. fol. 5, b). To this belongs Pānini's work, under the title of *çikshā*, which refers to the whole Veda. It has five divisions, each beginning with the words “*atha çikshām,*” &c. which divide it in *çākhā*, and bearing the name of *Prāṭiçākhyā*, has been also treated on by other holy teacher. The author of the *Prasthānabheda* here considers the word *çākhā* to mean a division of the Veda. The book called *çikshā* in a more strict sense (grammatical doctrine) is said to point to all the writings of the Vedas. This little work, which consists of but sixty verses, and which is usually counted as one of the *Vedāngas*, certainly treats merely of the most general rules of the parts of Grammar, which are also spoken of in the *Prāṭiçākhya*s, and is without doubt, but a compilation from the latter and new composition. Colebrooke has marked this book as such in the manuscriptural notes of his copy.† Another book of the same

* I will mark these books according to the order in which I introduced them, as first, second and third *Prāṭiçākhyā*, for shortness sake. In the first I can quote the paragraphs, as they are given in the MS. of the text in every single *Paṭala*, containing always from three to five verses, and also as they are marked in the commentaries. I quote the third also in the same manner. And since a revising subdivision is wanting in the second, we can consequently name only the principal sections, and we must add to this the number of pages in the MSS.

† No. 1378, E. I. H. if I do not mistake the number. Other MSS. of the *çikshā* may be found in the same place, Nos. 1981 and 1743.

title and contents, and at all event more valuable than the Vedānga, is called the *Mānduki-çikshā* (No. 680 E. Ind. H.) and contains 182 verses in sixteen divisions. But it is also of a later period.

The assertion of *Madhusūdana*, that the Prātiçākhyas explain merely single parts of the Vedas, is wrong, and the reason of this assertion may be a misunderstanding of the word çākhā, which in no way means merely a branch of the Veda writings, but also a branch of the Vedaic study, a school, and in this point of view is of the same meaning as *carantū*. Kṛityaciutamani in his commentary to Gobhilās Crautasutren (MS. of the E. I. H. fol. 1) proves to us that the difference of the Prātiçākhyas has its foundation in the variety of schools, when, commencing with a *Sūtra*, he says, it was taken from the *Mādhyandina çākhīya prātiçakhyā*. The quotation is from the *second* of the above books, and we learn in this manner, what we could not exclusively have taken from the contents of the work. It is certainly in one instance expressly said (fol. 81, 6.), that the Mādhyandinas do not make use of certain letters, and in another passage (fol. 12. b.) the commentary remarks that that school had a certain term, which was indeed also that of the text. At this moment I can think of only one passage from Śāyanas commentary to the Rigveda, in which he quotes a Prātiçakhyā (No. 2133, E. I. II. fol. 21 a.) without any further reference. The quotation is from the *first* of the abovementioned Prātiçākhyas, as likewise the note in the commentary to Pānini I. 1, 9. The passages of the commentary to Pān. VIII. 3, 61, and VIII. 4, 67, speak in general terms of those books. One of my proofs of the antiquity and the original designation of these books is founded on the following passage of the Nirukta I. 17, para. sannikarsha : sahitā pada prakritīni sarvacaranānā pārshadāni. "The Sanhitā is the greatest contraction (of the words); pada (the single separated words) is the fundamental form of the Sanhitā; the (grammatical) books of instruction of the schools are also of this opinion." It is remarkable that the first words of this passage "para; sannikarsha sanhitā also are found as Sūtra in Pānini I. 4, 109. They are however by no means of that description, that we have thence to conclude Panini's dependence on Jāska, or *vice versā*, both might have used such a significant word on an object, so much discussed, from a more ancient source. What are now the pārshada and what the carana ?

Durgá explains this passage perfectly satisfactorily : sarveshâ caranânâ sarva-câkhantarânâ ity arthe :—Kim : pārshadani svacarana parshady eva jaiopraticâkhâ niyatam eva padâ—vagraha pragrihya krama sanhitâ svara lekshanam uchryate tânîmâni parshadâni pâticâkhyanity artha.—That carana can mean nothing else but school is clearly explained in Gâgaddhara's commentary (MS. of the E. I. H. fol. 6. b.) to Mâla-tîmâdhava, p. I. 1, 2, of the Calcutta Edition ; “ carana guruva iti | carana-çabda : çâkhâ viceshâdhyayana paraikata pannagana sangha vâci (tatra samûhe tegurava kriya kritvâ vedâdhyâpitra : | sagururja : kriyâ kritvâ vedam asmaî pagachatita smriti : | gadva caranai : Kalâpâ dibhir gurava mahânta : | It is of exactly the same meaning in Pânini II. 4, 3, and VI. 3, 86,* and thence we see that before that grammarian, there were already many more schools in existence.

Pârshada means, according to Durgá's explanation, a book of instruction treating on the grammatical rules, adopted as a guide by one or the other of these schools, and Prâtiçakhyâ must be considered as an adjective which marks the peculiar differences of the Parshada. From this alone we might conclude that our Prâtiçâkhyas are nothing else but the Parshada of the çâkhâ. Add to this that the quotation of Yâska, “ pada-prakriti : sahita ” is really taken from Prâtiç, I. pat. 2. 1, and that also the remaining Prâtiçâkyas contain that doctrine of the connection of the pada with the Sanhita. Prât. III. 1. f. 32. a. atha sahisâyâm ckaprânabhâve | yathâyuktad vidhi : Sâ prapriti | similarly Prât. II. 1. f. 16. b. 3. f. 25. b. Besides this the first Prâtiçâkhyâ bears the title pārshada, and is mentioned in the introduction as such : and lastly, Uvaṭa remarks in a commentary to the second Prâtiçâkhyâ (fol. 41. b.) to a Sûtra, which treats of the sounds ri and lri, that the same are considered in other pārshadas, as

* In the first passage (II. 4, 3,) it appears to me, that that the Sûtra was not correctly understood by the commentators, and after them by “ Böhthlingk.” In my opinion anuvâde means “ in the citation,” and the Sûtra means to say, that when the quotation of the opinion, &c. of two schools is given, both names are as Dvandva, and in the singular number. Considered in this point of view, Sûtra has a meaning, and one can explain the singular, while according to the commentators, one does not know why the plural is not as correct here as in the other case. I give here an example from Prâtiç III. fol. 46, a “ dvâv Uttamolloûjasya repham. Both (visarga the antecedent of repha and kepha) become repha according to the opinion of the Uttama and Uttauja.” That Pân. I, 3, 49, in his commentary on the root vad with ant, has it in quite another sense, and adduces quite a similar example, can be no proof of the above.

svarabhakti, and on this he quotes a passage of the first Prâtiçâkhyâ. In the third also they really bear this denomination (II. 9, &c.) And if we have assigned that denomination to two of these books by external evidence, the identity of the contents and of the posterior title will be of sufficient proof with regard to the third.

At last, what concerns the schools to which we have to assign these writings, the school of the Mâdyhandina, is pointed out for the second Prâtiçâkhyâ, from which originated an edition of the Yajurveda, as well as of the Vâg'asaneya Sanhita, and especially one of çatapathia Brâhmana. At the conclusion of the book it is ascribed to Kâtyâyana, with the words: "eva svarasarkârâyo : Pratishshapayitâ Bhagavân Kâtyâyana idâ çâstrom âha."

Not merely the Sûtras of the Yajurveda, and according to some, the Anukramani of Rik, are said to originate from this Kâtyâyana, but also especially the Vâgasaneya Sanhitâ, which latter are particularly pointed out in the manuscripts (to B. No. 965, E. I. H.) that they are those of the Mâdhyandina.

In the introduction by Uvâta to Prâtiç. II. fol. 41. b. as well as by Shadguruçishya in his Vedadipa, the introduction to the comment of the Anukramani (after an Oxford MS. fol. 6. a.) the first Prâtiçâkhyâ is ascribed to Caunaka, on whose shoulders many other books are thrown, for example the already mentioned Brihaddevatâ, a book with the title of Rigvidhâna (about the application of the hymns of Rig to various purposes) which is yet extant; a Pâdavidhâna, the fourth book of Aitareya Aranyaka and several other writings on ceremonies. The abovementioned introduction of the first Prâtiçâkhyâ originates without doubt from Uvâta; after Caunaka is pointed out as the originator of the Parshada, and the author has expressed his intention to explain the same; he continues with the following verses, which I here write down, since their explanation may be doubtful: Champâyâ nyavasatpûrva Vatsanâ kulam : riddhimat : Yasmin dviga-varagâtâ bhahvricâ pâragottamâ Devamitra iti khyatas tasningâto mahâmati sachaisha pâreshada-çreshtha : sutas tasya Mâhatmana Nâmnâ tu Vishnuputra sa kumâra iti çashyate teneja jog'itâ vritti, sakpshiptâ pâreshade sphuça Parigrihnavutu viprendrâ : supasannâ imâ mama : agnânâd yad ayukta syât tad rigû-kritya grihjata. In Campâ there lived a noble race of the Vatsas, from whom Devamitra descended, whose son Vishnuputra is

said to be a celebrated teacher, and author of the commentary to the *Prâtiçâkhyâ* before us. The writer of the introduction would have founded his comment on this commentary, but now he says as above,* that he began *svaçaktyâ* with a commentary and moreover further on he claims the indulgence of the learned, which he would likely not have done this, had his work been nothing else than an extract (*yakshiptâ*) from a more ancient book. One might therefore conclude that the author of this introduction was *Vishnuputra*, and that he spoke of himself in the third person, *ya chaisha bis sphuṭa*: *sâkship* might then be explained as meaning “condensed.” But in this case the passage would contradict the abovementioned ends of Chapters, and the *Pârshada çreshtha*, were not in its proper place. I would consequently always prefer and accept the first explanation, that *Uvaṭa* had in the words “*teneyam, &c.*” underrated the extent and the value of his labour. In *Uvaṭa*’s commentary we would thus have a work founded on the more ancient explanation of *Vishnuputra*. Though *Uvaṭa* himself is more ancient than *Mahidhara*, the commentator of the *Vâgasaneyî* (*Colebr. Ess. I. p. 54, n.*) and more ancient than *Devarâga*, the commentator of the *Neighantuka* he can yet not be very much earlier since he quotes *Puranas* in some passages.

As regards the *Sûtras* themselves, there appears to be no reason why we should not consider them the rules of a Veda school which took its name from *Caunaka*, of the existence of which we have however no other evidence than the importance of the name in the later tradition of the learned treatment of the Veda, and perhaps also their presence in the compound of *Câkala Cunaka* (of the *gana Kârta-kaugapan*) where it appears at the same time with the school of *Câkalya*. The first *Prâtiçâkhyâ* has repeatedly a particular regard to the doctrines of this latter, and it is imaginable that there was a nearer connection between the scholars of *Caunaka* and *Câkalya*.

The third *Prâtiçâkhyâ* differs from the two previous ones in a most remarkable manner. Among the twenty names of grammarians with which he gives authority to his rules, there is not a single one which can be found in those two, or even in the *Nirukta*, while the three last mentioned books appear on the whole to have the

* In the proximity of the modern *Compassur* near *Bhâgalpore* (*Burnouf Introduction, para. 149, n. Wilson, Varh. Pur. p. 445.*)

same more ancient literature in view. There is yet another difference. The first Prâtiçâkhya appears to relate throughout to the Sanhitâ of the Rik in all his examples which he chooses, and sometimes even quotes its hymns after their authors, for example II. 7. Gotame châminanta, with Gotama the last *a* in aminanta with au Anunâsika before the vowel *e*. (The quotation relates to Rik, I. h. 79. 2.) Though the second book does not mention any source for its quotations, yet I am lead to believe, that by far the greatest number originates from the Sanhitâ of Rik, notwithstanding the circumstance that according to Indian tradition the zeal for the Vâgasaneyâ Sanhitâ and the Catapatha Brâhmana is only ascribed to the school of Mâdyandina.

The Oxford Prâtiçâkhya on the contrary, not only shows an immense difference in the choice of its quotations, but it also very frequently gives beginnings and names of sections, whose examples it quotes, among the latter, for example: grahaukhya yâgyâs certain Chapters of the Taittiriya Sanhita bear these liturgic denominations. I have had no opportunity to investigate, whether these examples may be found in the respective parts of the above mentioned Sanhitâ, the same denominations probably apply to the Vâgasaneyi. But that the Taittiriya Sanhitâ is rather the source of Prâtiçâkhya, appears to me probable, from the naming of Taittiriyaka in some of his Sûtras, which treat of sound and pronunciation. (II. 11.) Notwithstanding this difference, there is of course very frequently an identity of examples, which can be very simply explained from the fact that both collections of Yajur have a great number of sections in common with the Riksanhitâ. The author of the commentary to this book appears to be, as I have already mentioned, to be another than Uvaṭa. From the quotations at the end of book from Garuḍa Purâna, Devi Purâna, Brahma Purâna and Bavishya Purâna, we can guess of the time when he lived. The difference of these books then appears to arise by no means from the fact that they give a grammar, which in point of matter greatly differs one from another, and is based on different Vedaic books, but on the contrary their contents are essentially the same, if we do not speak of mere superficial differences, as in all the Veda writings it is the same style throughout found, their difference results only from the more or less exclusive use of the one or the other book in the choice of the document and from the manner of treatment, as of course in different schools it must be different.

I here note down a list of the grammarians to which the Prâtiçakhyas refer. These names, as well as the whole Indian grammar, have also a historical meaning, for it appears that the dryness of the empirical analysis of language alone was powerful enough to overpower the imagination and to rescue the past from its all-consuming power. As there lies a treasure of historical and geographical knowledge in Pânini, we possess in the Prâtiçâkhyas the history of the Vedas study, and at the same time the history of one side of Indian development of mind which will always be again recognized as the centre of Indian life which runs through all centuries.

The first Prâtiçakhya contains the names of the following teachers :—

1. *Cakalya* ; his school *Câkalâs* is also mentioned. According to Nir. VI. 28, the *pada pâtha* originates from him, and *Durgâ* (ad. 1. c.) calls him *pada kâra*. He is quoted by Pânini I. 1, 16 ; VI. I, 127 ; VIII. 3, 19, 4, 51, and in Aitareya Aranyaka III, 2, 6. Sayana to Rik. V. 4, 28, calls him *Maharshis*. Let us also further observe the passage of the *Açvalâyana Sûtras*, quoted in my first part. He is one of the speakers in the *Vrihad Aranyaka* to Vol. III. 9.

2. *Câkatayana*, likewise mentioned by Pânini III. 4, 111 ; VIII. 3, 18, 4, 50 ; compare the *Gana nadâdis*. He is also mentioned in Nir. I. 3, 12, 13.

3. *Gârgya*. Pân. VII. 3, 99 ; VIII. 3, 20, 4, 67. (*Gana gargâdis*) *Açvalsû. grh* III. 4. Nirukta 1, 3, 12 ; III. 13. Ar. IV. 6.

4. *Mandûkeya*, mentioned in Aitareya Arany III. 2, 6. *Açv. gr. sù.* III. 4.

5. *Paneëla*, *Bâbhrauga* *Açv. gr. sù.* III. 4.

6. *Vedamitra* (compare Wilson. Vish. Pur. p. 277.)

7. *Vyâli*, several times quoted in Hemachandra.

8. *Vaijaska*.

II. The second Prâtiçâkhya mentions the following :—

1. *Aupacivi*.

2. *Câkalya*.

3. *Cakatâyana*.

4. *Caunaka* (vide above.)

5. *Gârgya*.

6. *Gâtukarnya*. This grammarian is mentioned in Aitar. Arany. V. 3, 3, together with *Gâlava* and *Agniveçyâyana*, as an authority of the

rules which are to be observed during instructions in certain parts of the ceremonial Vrh, Arany. II. 6 ; VI. 6.

7. *Kāçyāpa* quoted by Pān. VIII. 4, 67.

8. *Kāva*.

III. In the third Prātiçākhyā we find the following names :—

1. *Agniveçya*. Pāngāna tikakitāvās and Garga. Vrh. Ar. II. 6.

2. *Agniveçyājana*. Do. and Aitsr. Arany. V, 3, 3 (vide at II. 6.)

3. *Atreya*.

4. *Bhāradvāja* mentioned by Pan. VII. 2, 63. Vrh. Ar. II. 6. IV. 6.

5. *Çaitāyana*.

6. *Çānkhāyana*. Gana garga.

7. *Gautama*. Vrh. Ar. II. 6. IV. 6. Açval. çrautasū. I. 3 ; II. 6 ; V. 6.

8. *Kāndamāyana*.

9. *Kauhalīputra*.

10. *Kaindinya*.

11. *Mācākīya*.

12. *Paushkarasūdi*. Pān. gana Taulvali and Jask.

13. *Plākshī*.

14. *Plākshāyana*.

15. *Sankritya* gana Garga Vrh. Ar. II. 6.

16. *Ukhya*.

17. *Vālmīki*.

18. *Vātsapra*.

19. *Vātabhīkāra*.

20. *Hārīta*.*

It is superfluous to observe here that those of these names, to which there is no special reference, belong for the most part to the Vedaic literature, and if, in Indian history, every important epoch is characterized by a number of peculiar proper names, we may reckon those here mentioned as belonging to the more ancient epoch. By a reference

* To complete the whole we may here enumerate all the other grammarians or commentators mentioned in the Nirukta :—1. Aupamanyava ; 2. Audumbarayana ; 3. Agrūyana ; 4. Aurnavabha ; 5. Carmaçiras ; 6. Catabalāksha ; 7. Çakatāyana ; 8. Çakapūni ; 9. Çarçya ; 10. Gālava ; 11. Kaechakya ; 12. Kautsa ; 13. Kraushituki ; 14. Maudgalya ; 15. Sthaulashthivi ; 16. Taitiki 17. Vārshyāyana.

of the appearance of a large number of those teachers in the Upanishads, Vrihad Aranyaka and Aitareya Aranyaka, there is no doubt that these books belong to a later period of literature.

The number of Grammarians, whose opinions are preserved to us in the Prátiçákhyá, already shows how far this art had spread, and *Yáska* (Nir. II. 2.) confirms this in a remarkable statement, according to which verbal roots are marked grammatically, in four different ways by the grammarians of four different countries. These four tribes are, besides the Práçya and Udícya, also the Kamboga and Arya. Hence it is proved most irrefutably that the Kamboga were not only an originally Indian nation, but also a nation of Indian civilization, so that this civilization reached as far as the Hindu Kush at the time of *Yáska*. If we turn up the well known passage of Manu's laws (X. 43,) we will find that they were afterwards reckoned to be barbarians, because their manners became afterwards changed, and they were justly called Indians by the Greeks and Chinese. The same therefore happened to the Kombagas although in a less marked manner, which took place among the Zend-people and the Indians at a more remote period.

In order to give a proof of the various grammatical matter which is treated in the Prátiçákhyas, I would have preferred the chapter concerning the accent for which we expect the most abounding and complete material here, as in the most ancient grammar which at the same time especially treats on Vedaic writings; the difficulty of printing it however, rendered more unbearable by being printed in Roman characters owing to the great number of accentuations, causes me to reserve this for a later and more circumstantial work. Instead of this we will speak of the doctrine of the Anusvára, which contains also something peculiar to the Vedas, and also of the *Pátha* of the Veda.

ON THE ANUSVÁRA.

The most remarkable mode in the first and second Prátiçákhyá, in distinguishing the nasal sounds is that

1. All colored (*rakta*) or nasal sounds are called *Anunásika*, comprehending the last of the five *Vargas*, the *Yamas* and the *Anusváras*.
2. Only the five nasals of *Varga* are called *Násikya*.
3. Those nasals which are not *Násikya* and not *Jama* are called *Anusvára*.

On the other hand in the first of these books any nasal element in general is again marked by the name of *Anusvára* (XIII. 1,) since it is said that according to the supposition of several grammarians the *Anusvára* was the source of the nasal sound, like the vowel a, i. e. a vowel element, that of the clear sound (*áhur ghoshá ghoshavasánn akáram eke nusvaṛam anunásikánám.*)

A further difference however is found in the third *Prátiçákhyá*, where an *ánunasikya* is distinguished from *anusvára* and *násikya*. This *ánunásikya* is Bopp's primitive *Anusvára*. It will perhaps be well to adhere to this distinction, of which *Pánini* also is aware, although he does not always bear it in mind. As regards the pronunciation of the *ánunásikya*, the grammarians are, according to the account of the same book (I. 5,) of contrary opinions. *Caityáyana* insists that the *ánunasikya* is pronounced more emphatically (*tivratarám*) than the *anusvára* and the *uttama* (the nasals of the *Varga*.) *Kauhaliputra* considers all the nasals as equal, and *Bháradvája* declares the *ánunásikya* *weaker* than the *anusvára*. It is possible that this contradiction may have its foundation in the different usage of the word *Anusvára*.

The nose alone (*Prát. II. 1, fol. 8. b.*) is partly spoken of as the organ, with which the nasals are formed, and partly both mouth and nose (*Prát. I. 13, 2; rakta vacano mukhanásikábhjám*) or both organs are limited to the *ánunásika* in a more strict sense (*Prát. II. 1, f. 8, b.*) and then the *anusvára* is said to be pronounced with the *hanumúla* (in the posterior part of the mouth.) These contradictions which are found in the same manner, with *Pánini* (comp. *Böhtlingk* to I. 1, 8, 9,) originate from the circumstance, that the nasal was at one time considered as inherent to the vowel, and at another separated from it. Or how could, for example, *Pánini* consider the *anusvára* once as a vowel and then again say that it was pronounced merely with the nose, while he even points out to the nasal consonants of the *Varga* mouth and nose as organs, i. e. he considers them at the same time of a nasal and vowel kind. In the same manner the first *Prátiçákhyá* also speaks of the *anusvára* as being as well vowel as consonant. (I. 2).

As to what regards the usage of the real *Anusvára*, or according to the above distinction, of the *Anunásikya*, as being in this respect a particular sound and no substitute, so far as in the place which it occupies every other nasal is impossible, the *Prátiçakhyas* teach the following :

1. THE REAL ANUNASIKYA.

Prat. I. 4, 6 : *n* at the termination of a word when following a long *a*, even when a vowel follows, is lost; *a*, in the *ánpadá* : *padavritayas*. We have as examples *agrán*, *gágrasánán*, *devahûtámán*, *badbadhánán*, *Indra somán*, *trshánán*, *nodeva deván*, *hanta deván* (for example *devahûtama açván*).

Note.—Both the other Pratiçakhyas explain this case by a peculiar process; Prat. II. 3; fol. 38, 4; *ákáropadho jakáram*, i. e. the *n* terminating a word after a long *á* becomes before a vowel, a *y*, and according to an earlier *adhikára*, the *upadha* becomes nasal (likewise Prát. III. 1, 9). *Mahán* becomes *indras* consequently *maháyindras*; after the *Sât-rajá-vayo* : *padántayo* : *svaramadhye lopas* (4. fol. 56. b.) the *y* drops and it remains *mahá indras*. After the same manner the omission of the *Visarga* is treated in the very same passage (4. fol. 44, b.) *kanthya-purvo yakáram ariphitas*, (namely, *visarg'anîyas*) consequently *chitra* : *áditýánám*, *chitráy áditýánám* *chitra áditýánám*. *Pánini* explains the latter change in the very same manner (VIII. 3, 17, 18, 19,) while he does not use it to explain the omission of the *n*; the difference here is certainly much greater. We have according to the opinion of the Indian Grammarians another example for the same occurrence in the word *pra-uga*. While the same is given in the Práticakhya I. 2, 1, without any further explanation in connexion with *puraetá*, *tita-unri* and *nama uktibhis*, as *vivrittí* within the word; the second Práticakhya (4. f. 57, a.) has the *Sútra prayugam ití yakára lopas*. I doubt whether for this word, which in the *Sanhitá* itself is only twice met with (I. 7, 5, 6, and X. 11, 2, 3) we can give another derivation than that of the Práticakhya, which the later grammarians also adopt. The *y* appears like the *v*, to have been capable of such a softening (*laghuprayatnataras*, according to *Cákatáyana*, with *Pán. VIII. 3, 18*.) that nothing of it remained but the hiatus between the vowels, which it had separated (as in the *vikára* for *ai*, for instance *anvetavá u*). On that account we might regard the same on one side as a means for explaining a hiatus, on the other side however we might, (as the first Práticakhya) object to this substitution, and treat as hiatus (*padavrittayas*) the same *Sandhi*, which the second will explain by putting in a semi-vowel. It is however remarkable that the second and third Práticakhyas, as well as *Pánini* and the more ancient teachers quoted by

him, instead of choosing the *r*, which offered itself so naturally for explaining the change of the visarga, preferred the more distant *y* for that purpose. From this we are led to conclude that *y*, even in the cases where it is entirely preserved, had yet a much softer sound than *r*, and thence appears much fitter than the former letter, also there to be inserted where the grammatical abstraction alone required a consonantical element which in pronunciation was indeed not at all expressed. For how much the nasal element lost its character as a consonant in the above *ánpadá* : *padavrittayas*, and went off in a vowel, we observe, not merely from the given denomination of the occurrence, but also from an application of the nasal sign derived from it which will be described afterwards, and which does not allow to consider it as any thing belonging to a consonant.

(b.) In the *vivritty-abhipráya-sandhayas* *pívo anná rayivridhas*, *dadhanvâ yo, g'ug'urvâ ya* : *svavâ yâta dadvâ vá*.

N. B. Prát. II. 3, f. 37 b. has the same examples.

(c.) *Sparça-repha-sandhayas*. The terminations *ûn* and *ín* change their *n* in repha before hatam, jonau, vacobhis, yáu, yuvan, yûn, vanishlita (ut panîr hatam úrmyá madantá. Rik I. 24, 5, 2,) and before vowels *dasyûr ekas, nrîr abhi*.

N. B. Exceptions to (a.) are *asmán upa* (*dhenur vág asmán upa sush-tutaitu*) *etávan, sphurán, gachán* (*gachán iddadusho rátim*) *deván aját, hiranya chakrán* (*pacyá hiranya chakrán ayodashtán,*) *máyáván, ghoshán* (*áyat te ghoshán uttará yngáni. III. 3, 4, 8,*) *tán açviná, avidván* (*avidván, itlháparo acheté :*) *payasván* (*payasván agna ágali, I. 5, 4, 23*) *yagîyán putrán ádheli ; patin uro* (?) to c.

Prát. II. 3. f. 38. b. and 39. a. mentions besides an *adhýaya* beginning with *açva*, (of which book, I do not know) in which *án* remains unchanged before a vowel, as exceptions also the following : *lokán, mânushyáu, amitrán* before *ut* (*lokán udag'ayat, amitrán, unnayámi, manushyán udagáyátám*) and *án* before *ápnoti* and *iti* (the latter in the *Kramapátha*, in which moreover this change cannot take place.)

Prát. III. 1, 9, names as exceptions *raçmîn* (*raçmîn anu*) *çrapayáu, yamán* (*suyamán útaye*) *patangán* (*patangán asanditas*), *samánán, archán* (*archán Indra grávánas*) *yagîyán* (*yagîyáu upasthe*) ; lastly *án* suffers no change before *nd* and *atha* (*vidván atha*.)

(d.) *Sparṣoṣhma sandhayas*. Then, *n*, following a long vowel, is treated like the Visarga before the words charat (mahâç charati), chakre, chamasân, cha, cho, çhit, charasi, chyotnas, chaturas, chikitván.

N. B. Prát. II. 1, 5, nakára : çakára chaparas. Exceptions : áyan, airayan, ádhruvan, anadván, ghrníván (?) várúnán. According to Prát. I. the exceptions are : asmán (asmán cha tâç cha pra hi neshi. Rik II. 1, 16 ;) chamasân (yádâ vyakhyac chamasân chaturas. R. II. 22, 5, 4) paçûn cha sthâtrîn (?) cha I. 12, 8, 6.)

n is treated in the same way as Visarga in the combinations (dvaipada) tâste, sarvâs tán, devâs twa tâs trayasva, avadâs tvam.

(e.) *Sandhir vikrântas* ; in nrî : patibhyas nrî ; pranetram, nrî : pátram (I. 18, 1, 1.) svatavâ : páyus and nrî ; páli çriṇudhî (giras).

N. B. To nrî : pati according to the observation of the commentator, is expressly added to çriṇudhî, because it is said in another place rakshâ nrin páhyasuratvam asmât. Prát. II. 3, fol. 28. a. only says nrin pakáre visarganîyam. Compare Pán. VIII. 3, 10. For svataván we give the example, bhuvâs tasya svatavâ : payuragne. Compare Pán. ibid. 11.

As an appendix the following is said : àdi-svaraç cottareshá pade pi, mâspacanyâ mâçchatve, mâçchataçcha. Examples : mâspachanya ukhâyas (Rik I. 22, 6, 13.); mâçchatve vá priçane vá ; bradhna mâçchator Varunasya (VII. 3, 11, 3.) These words are mentioned here and not below in the section of ánunásikya within the word, no doubt, because they were considered in the relation of Sandhi.

In the five previous cases, when *n* disappears, or becomes either repha or úshná, the vowel preceding it (pûrvas tat sthánát) is said to become nasal.

N. B. These are the Sandhi of *n* peculiar to the Veda. As for the remaining changes of *n*, for example, before *l*, as well as for *m* being changed to anusvára, the same rules are given, which are also met with in Pánini. As the latter leaves it optional to adopt in these cases a lopa of *n* and *m* and to change the upadhâ to a *nusal*, or to preserve the pure vowel, and to chose the change of *n* and *m* in Anusvára, so we find both opinions in the Prátiçakhyas. The first and third adopt the former, and the second the latter. According to the second (3, fol. 40, b.) Kasyapa and Cákatáyana permit the use of the lopa, and Aupaçivi adopts the nasal sound of the upadhâ before a vowel, and the

anusvára before a consonant. The third Prátiçákhyá also mentions expressly the different opinions (II. 3.)

In quite another chapter (XIII. 2,) viz. in that of the pronunciation, and in the immediate annexation to the varnátina gunaçastram, the first Prátiçákhyá treats the Anusvára *within* the word (anan tasthan anusvaram) which Vyáli (XIII. 4,) calls *násikya* or *anunásika*, and mentions also in that place those cases in which the Anusvára follows a long vowel.

These are—

(1.) The *Anusvára* in the plurals of neuter nouns ending with *áshma*, before the termination *si* and *shi*, for example *chakshúshi*.

(2.) The *Anusvára* before the terminations *sa* ; *sá*, *san*, *sam*, if no *námí* precedes it, but a *y* or *v* not produced by means of Sandhi ; for example : *vidvâsan*.

(3.) In the words *gighâsan*, *pâsûre*, *mâsam*, *pumâsam*, *paûsyam*.

(4.) In the praçlishta sandhi (coalescing of two similar vowels) example : *âbhlûtâças*, and in the abhinihita sandhi (Elision) *havâmabê homucham* ; and lastly,

(5.) In the words *mâçchatre* and *ayâsam*.

N. B. The third Prátiçákhyá is very explicit in the enumeration of the Anusvára within the word, without however containing any thing worth remarking except the following passage, of whose explanation however I am not quite certain, since I have not the commentary to it : (II. 4.) *Akâre 'károkârá : si-shi-parâ : pádantayo : vikrite 'pi ana-káro hrasva Sânkrit yasya.* The last sentence cannot well otherwise be completed than : *an-ákáro 'nusvâro (or svarâ) hrasva anunásikâ ápadyate Sânkrit yasya matena.* The opinion of the grammarian Sankritya would accordingly be, that among the neutral roots in *s*, only those in *as* before the plural termination of the first and second cases had the double augmentation by inserting the nasal sound, and the elongation of the vowel of the final syllable, while the others pointed out but the first, and accordingly for instance *havîshi* must be formed.

2. The euphonic Anunásikya.

In the second Paçala of the first Prátiçákhyá (6, 7.) which treats of the Sanhita of the vowels, we meet with the following section under the *Adhikâra* "*prakrityâ.*"

Svare pádádâ udaye sacheti, shv-antâ g'osha charshaniç charshani-bhya : :

Ekárántá mitrayor asmad ívan (?) namasyur ity upadha chety aprikta : ॥

Ekaraukára-paraucha kanthyau Luchád arvág, Gotame cháminanta ।

Vibhvá dhartá vipanyá kadáyá mátety rikáre, 'py apádádibhági ॥

Paruchepe bhîshá pathety akáre, evâ agnim Atishu sá plutopadhá : ।

Sacádayo yá vihitá vivrittaya : plutopadhás tá anunásikopadhá. ॥

Before the vowel beginning with a Pada, the word *sacha* remains unchanged (Rik I. 10, 1, mandishta yad uçane Kávye sacá Indro. . ; X. 2, 4, so chin nu vrishtir yûthyásvá sachá Indra : . .) ; further, the particle á after the terminations shu, and e, as well as after the words charshanîs, charshanibhya : mitrayor, ivan (?) namasyus. Examples are : Rik IX. 7, 7, 4, ag'ig'ano amrita marthyeshv â ritasya dhar mann amritasya châruna : ; III. 3, 5, 2 ; áyáhi pûrvîrati çarshanîr â arya áçisha ; to ekárántam probably, for example : V. 4, 4, 1 ; ámenyasya ragaso yad abhra â apo.

Further the vowels a and á in the hymns which precede those of Luça (Rik X. 3, 6, 7 ;) remain further unchanged (at the final Pada) before e and o ; examples : Rik I. 7, 3, 4, Ghanenâ ekaç charan. . . ; I. 16, 8, savâya cvâ ; . . II. 2, 3, 2 ; tasmá etâ bhârata tad va çayâ esha Indro . . ; IV. 4, 3, 2. sukriyayá yat svapasyayá chá eka. . . ; (X 3, 5, 5. nyuptaç cha babhravo, vâcam akratâ emîd eshá nishkritá gárinîva.)

Further, with the Rishi Gotama, the word aminanta (here we may adduce the following apádádibhági, for the passage I. 13, 6, 2 says : á te suparná aminantâ 2 evai :)

Further, also in the middle of the Pada, the words vibhvá, dhartá vipanyá, kadá yá (or ayá?), mátá before the vowel ri (for example, Rik IV. 4, 4, 6, vibhvá ribhavo yam ávishu : । II. 3, 6, 4 ; pra sim ádityo asrigad vidhartá ritá sindhavo varunasya yanti (here also in the metre), the same. IV. 1, 2, 12, pra çardha ártta prathamá pipanyâ ritasyo. . ; agne kadá ritachit apa yá mátá rinuta vragá go : ।)

With Paruchepa also the words bhishá and pathá before a (I. 19, 7, 6. ghrinána bhîshá adrivás ; ibid. 3, 9 ; jáhi pathá anehasá. In the Atri hymns (i. e. in the 5th Mandala) evâ agnim, with pluta of the first vowel (V. 2, 11, 18, evâ agnim vasûyava : । V. 1, 6, 10, evâ agnim agur. . . । The commentator gives an example for the contrary from the Vasishtha Mandala.)

In all cases (pointed out here by *sacha*) of the meeting of two vowels, the first becomes pluta and anunásika.

N. B. The second Prātiçākhyā mentions this case only in so far as the Anunāsika before vowels is spoken of in general terms; the third however has the following passage (II. 3,) apragrahá: samánáksharány anunásikányekesham padácha plutá çánkháyana-kándamáyana: akárástn sáhitáyám api sarvam ekayama pûrveshám | “The vowels a, i, u, with the corresponding long ones, (when they meet in vivritti) unless they are pragrihya, become nasal, after particular teachers; in the Padapátha the pluta becomes nasal according to Çánkháyana and Kándamáyana, *a*, however also in the Sanhitá. According to the opinion of the Pûrvayágnika every single vowel becomes nasal.” The latter would then relate to the pronunciation in the recitations and hymns of the sacrifice. I do not know, how to explain the ekayanam in any other way than to identify it with the aprikta of the other Prātiçākhyas.

Pánini also recognises the nasal sound, which I have distinguished as the euphonic one, in the Sûtras VI. 1, 126, as being the particle á, and in the very general rule VIII. 4, 57. I confess, that I cannot conceive, what the latter is to say, as it is there without any further explanation, (Böthlingk also has not explained it.) Does the avasáne mean: “at the end of a word” or “at the end of a páda” or “at the end of a sentence?” The examples of the commentators do not notice it at all. I suppose the latter, and refer it to the elongation of the vowel which terminates the sentence, in ceremonies of sacrifice and similar things. As the mixed vowels were generally elongated by separating their elements, (for example Aitareya Bráhma. II. 7, at the end of a praisla adhrigá 3, u instead of adhrigo,) so a somewhat nasal sound would have been necessary for the elongation of the single vowels. In fact I would in general give the same signification to the Anunásikhyā which is not the substitute for a real consonant. It would only have served to point out the vowel, which was to be elongated with particular emphasis and to be protected from coalescing with the following one. That the nasal sign was chosen for this purpose, was by no means without foundation, in so far as the vowel, which is lengthened and pronounced in full, easily assumes a nasal sound; the anunásikhyā was here so much the more fit, as according to the Indian grammar it does not in fact express any thing belonging to a consonant, but only a quality of the vowel. The calculation of the latter in the measure of

the syllable speaks here especially in favor of the latter. The first *Prácticakhya* (XIII. 3) says: *hrasvám ardha-svara bhaktyá samáptám anusvárasypadhám áhuryeke anusvárá távataivádhiká hrasvopadhá dīrghapūrva tad-ūnam.* “According to some authors a half mora is wanting to a short vowel preceding an anusvara; the anusvára following it is added with the same measure (of half a mora); a long syllable before the anusvara is in the same proportion shorter,” i. e. while the syllable has originally two *mátrás*, one and a half only belong to it in this case, the other half is kept in the anusvára; the short syllable in the same manner has but half a *mátrá* in the vowel and half a one in the Anusvára.

But that the Anusvára is in reality nevertheless a consonant, requires no proof, and the Indian *prósody* treats, notwithstanding that measurement, the short syllable with Anusvára as being long in every place, which is only possible by a *sanyoga*. The Anusvára also has, according to the above, just the measurement of a consonant, i. e. half a mora (*Prat.* II. 1, 6, 7, b. *vyanganam ardhamátrá.*) It will of course only be possible to give a perfectly sure statement of this, if we know from other sources this system of the measurement of single sounds and their time in rhythm, of which *Páuíni* does not instruct us.

In conclusion, I make use of the above laws for the *Anunásikya* in *Veda* for explaining a passage of the *Rik*. In *Rik* I. 9, 7, 6, (*hymn* 50, 6,) *Rosen* has:

Jená pávaka chakshasá bhuranyantá ganá anu |

Twá Varuna paçyasi.

Rosen translates no doubt according to *Sáyana*: *quolumine lustrans! terram homines sustentantem intueris, protector!*

He consequently supposes *ganá* to be the accusative of the plural, and the nasal sound of the *á* would be regular. But it is quite impossible to find in the accusative masculine *bhuranyantan*, a *terram nutricem*, or any thing similar. Besides I doubt, that in the *Vedas* one can meet with a passage in which *bhuranyati* has the signification which was put to it in the later grammar, namely: “preserve, nourish” (s. the *gana-kanḍváyayas*). On the contrary, it is brought forward in the *Naighantuka*, II. 14, among the *gati karmánas*, and the adjective *bhurangu* among the *kshipra námáni* (*Naigh.* II. 15, *Nir.* XII. 22.) The latter is at the same time the denomination of the eagle or

falcon (çakuni. Nir. 1, c. u. Sâma II. 11, a. 13). *Bhurana*, a predicate of the Açvin; for example: Rik I. 17, 2, 11; X. 2, 13, 1, (explained by Rosen with sustentatores). This predicate is explained by Durga (to Nir. VI. 28,) as meaning *bhartârau çîghrau vâ*, and this denomination "the fast ones," appears to be more fit for those divinities with horse and chariot than *sustentatores*. Lastly, he explains the *bhuranyantam* of our passage (to Nir. 12, 22) with *kshipra gaçlan-tam*. The word, according to my opinion, means "to stir up" (*incitare*) and in a medial sense "to be on the alert, to be active," so for example Rik IV. 3, 6, 3, *srigad yad asmâ, ava ha kshipag gyâ kriçânur astâ manasâ bhuranyan*, "when the well hitting (?) marksman discharges (his arrows), on him the tendon he flings with an active mind," i. e. seizing the moment. V. 6, 1, 6, *gharmâ yad vâm arepasâ, nâsat-yâ, 'snâ bhuranyati*, "when he stirs your pure flame, Nâsatyâ, with the mouth" (breath); thus *bhuranya* is also said of the fire. I. 12, 4, 1, *çrî-nann upasthâd divâ bhuranyu : sthâtuç çharatham aktûn vyûrnot* "boiling he rises towards heaven, nimbly (whirling) he uncovers all that is firm and moveable, he uncovers the nights." I further suppose *ganâ* to be the accusative singular, and translate, "With the splendor, with which thou, oh purifying God, surveyest the active human race thou walkest through the heavens, &c." A long syllable was indispensable in that passage of the verse; *ganam* became *ganâm* according to the elongations so frequent in the Vedas; and *âm* was treated as, according to the above laws, *ân* would have been treated; the long vowel turned *anunâsika*. It is worth remarking that the very exact Vedaic MS., 129, E. Ind. H. has *ganâ* as well in verse 6, as in verse 3, and the same hand, which put the accents with red color to the writing, has also added the long vowel. There is also herein a pointing out the origin of the *â*, which I first supposed. The word *ganâ* is besides used mostly collectively in the singular *exemp. gr.* Rik IV. 1, 9, 1; *â devayum ganâ*. Sâma I. 1, 2, *manûshe gane* 10, 6; *Swadhvarâ ganâ*, Rik V. 1, 11, 1, *ganasya gopâs*.

THE PÂTHAS OF THE VEDA.

The Indian Grammar considered (see above) the single word as it were, torn from its union in the sentence, as the foundation of the speech; on that account the latter itself, although the observation of the laws of sound, which we call euphonic, was a necessity in

that foundation, appeared as something derived and standing in one line with the artificial union of word and sound, which are applied to the texts of the Vedas.

1. The Sanhitá páṭha is consequently already a secondary form of speech, a coalescing of the words, according to fixed laws. The three principal processes of which the Prátiçákhyas treat with regard to this Páṭha, are the *Sandhi*, the *Pluti*, and the *Nati*.

2. The Kramapáṭha is also termed Kramasanhitá or Pránasanhitá. It has two principal forms, as I have already mentioned above.

(a.) The *Varnakrama*. The principal rules of this Krama are given by Pánini VIII. 4, 46 to 52, who, however, does not mention the object to which they refer; it will therefore not be necessary to repeat them here, since a more exact investigation of the same would lead us too far, which would however in general not be unimportant for the laws of sound in the Sanscrit. The first Prátiçákhyas devotes a separate chapter to it, viz. the sixth Paṭala, and in concurrence with the third (II. 2.) notices for this manner of speech the most contradictory opinions of previous grammarians. The second Prátiçákhyas treats of it in the fourth adhyáya, fol. 53, etc, as well as in other passages. Böhtlingk has printed a small section to Pán. VIII. 4, 47, from the Vágasaneya Sanhitá, which appears to have been composed according to this Páṭha.

(b.) The *word krama*. It is fully explained in the tenth and eleventh Paṭala of the first Prátiçákhyas; there, however, it is called simply Krama and described in the following manner, dvábhyám abhikramya pratyá-dáyottará tayo : | uttarenopasandadhyát tathárdharcá samápayet : | *exemp. gr.* the beginning of the well known song of Vasishtha would be as follows : parganyáyápra | pragáyata | gáyata diva : | divasputráya | putráya a milhushe | milhushaiti mílhu she. | | The second Prátiçákhyas also gives some rules about it, and it does not appear to have been rarely made use of, although I myself have never seen a MS. composed in this Krama of the simplest shape. The Bodley Library at Oxford however possesses a very carefully written, accented and complete copy of the Vágasaneya Sanhitá in the Gatápáṭha, a more perfect exposition of the above Krama, in which the ardharcá "uru Vishno vikramasva urukshayáya naskridhi," is as follows : uru Vishno Vishua urúru Vishno | Vishno vi vi Vishno Vishno vi | Vishno (to)

Viśno | vikramasva kramasva vi | kramasvorûrn kramasva kramasvoru |
 urukshayâya-kshayâyorû-rukshayâya | kshayâya no na : naskridhi
 kridhi no naskridhi | kridhîti-kridhi.

However thoughtless such a repetition might be of itself, it yet possesses the value for us to confirm the text in a measure, that one MS. written in this manner does not leave any doubt (as to the text). The same in fact was also the object of Indian grammar. Nevertheless even that simple Krama which is supposed to have for its author Panchâla, the son of Babhru, does not appear to have enjoyed an uncontradicted authority. Since the Prâtiçâkhya itself rejects other modifications of the Krama, it finds itself under the necessity to defend its own doctrine against the blame of being treated in an injudicious manner. No object, say the antagonists, can be gained by this Krama (Kramana nârtha :) it had its foundation on the already existing Sanhita, without them it was impossible, and through them superfluous ; it is also said that it was not traditionally adopted (na çrntas.) The Prâtiçâkhya however, takes it under its protection against these and all other objections, and exposes its advantages in the following verses :

Viparyayâc, châstra-samâdhi-darçanât, purâprasiddher, nbhayor anâ-
 çrayât |

Samabhyupeyâd balubhiç cha sâ dhubhi : çruteç cha sanmâna-kara :
 Krama 'rthavân ||

3. The *Padâ-pâṭha*. Of this the second Prâtiçâkhya treats in the fifth Adhyâya, both the others speak of it but occasionally. It has not only the object to dissolve the Sandhi, but also the Pluti, and Nati. Lastly, every Samâsa is divided in its parts, and the separation (avagraha) is in the reading equal to one Mâtra. In this respect it will not be unimportant for the history of the more ancient grammarians to investigate, whether the Padapâṭha proceeds after the same ideas of Samâsa, which Panini gives. The principal effort of this Pâṭha, in general is directed to grammatical analysis, and it has been without doubt the first and most simple explanation of the books of the Vedas, at a time, in which, though the language of the same was still essentially understood ; single laws of sounds had already commenced to change ; the Krama readings on the contrary had in view less to explain than firmly to establish and to secure the texts.

A Fifteenth Memoir on the Law of Storms, being (PART I.) the Buckinghamshire and H. Co.'s Steamer Cleopatra's Hurricane on the Malabar Coast and Arabian Sea, of April 1847. The Hurricane of the H. C. S. Essex in June 1811, and (PART II.) some considerations on the loss of the Cleopatra Steamer, and for Steamers navigating the Eastern Seas in general. By HENRY PIDDINGTON, President of Marine Courts of Enquiry, Calcutta.

PART I.

In the month of April 1847, a very severe hurricane was experienced on the Malabar coast, in which, amongst others, the ship *Buckinghamshire* was totally dismasted and the H. C. Steamer *Cleopatra*, with convicts for the Straits is supposed to have foundered.* I addressed the Government and Chamber of Commerce of Bombay, as soon as the newspaper accounts reached Calcutta, to obtain all the information possible, and to both I beg to tender my respectful thanks for their ready compliauce with my request. I further, upon receipt of the first documents, forwarded to the Government of Bombay a set of Queries specially relating to the unfortunate *Cleopatra*, and these also have been filled up (though less explicitly than I could wish) and returned to me, so that it will, I trust, be recollected that the remark quoted in the note below was addressed to the Government of Bombay of 1842, and not to that of The Hon Mr. Clerk in 1847. And while preparing this paper, I am farther indebted to the Bombay Government for a copy of some remarks on this storm, and a chart of its track, by Captain Carless, of the Indian Navy, who has also appended some remarks on the loss of the *Cleopatra*, having himself very properly avoided standing into the bad weather in the *Sesostris*, when bound in towards the coast from Aden to Cannanore. I have also to express my thanks to Captain Twynham, of the *Peninsula*, and Oriental Steam Navigation Company, for an important log from Colombo.

* Verifying too fatally I fear, my half prediction respecting her and the *Semiramis*, in a former occasion, in the eighth of these memoirs (Journal A. S. Vol. XII. p. 397), where I have had to remark as follows—"I grieve to add that, to the disgrace of those who may deserve the blame, neither the log of the *Cleopatra* or of the *Semiramis*, both Government steamers, have been obtainable; I have strong suspicions that both ran headlong into the storm circles. Is the Government of Bombay aware that a mistake of this kind might cost it a steamer, or at least half of a lac of rupees of damages?" Not long after this occurred the instance of the H. C. Steamer *Pluto*, which vessel, in the face of every warning, ran headlong into a Typhoon in the China Sea, was utterly disabled, and narrowly escaped foundering, and on putting back drifted on the rocks of Hong Kong; her repairs, apart from the loss to the public service of her assistance at Borneo, costing probably 30,000 rupees.

As in former Memoirs, I first give the documents abridged of all non-essentials, and a tabular arrangement of them, and then a summary, showing on what grounds the storm track has been laid down as it appears in the chart, and finally in a separate section some considerations on the loss of the unfortunate Cleopatra.

Abridged Log of the Ship East London. Log from Capt. Twynham of Point de Galle—Civil time.

On 13th April 1847, the *East London* was at 8 A. M. in sight of the North end of the Maldive Islands, bearing S. b. W. $\frac{1}{2}$ W. 16 miles, which with her subsequent run, would place her at noon, in Lat. 7.21 N. ; Long. 73.34. E. Bar. 29.8, Simp. 29.66,* at 10 A. M.

P. M. wind N. W. b. W., throughout strong squalls, constant rain, and heavy head sea ; ship steering to the E. b. N. 5' per hour, Bar. 2 P. M. 29.74, Simp. 29.62, 6 P. M. 29.70, Simp. 29.5, 10 P. M. Bar. 29.68 ; Simp. 29.54. Weather increasing with heavy squalls, and thunder and lightning, to a gale at midnight and the ship preparing for bad weather.

14th April.—A. M. Blowing harder ; 4 A. M. a hurricane from N. W. Ship sprung a leak, shipping much water and in distress, being unable to leave the pumps to secure the sails blowing from the yards. Bar. at 4 A. M. 29.5' Simp. 29.4 ; noon 29.5, Simp. 29.38. Lat. Acet. 7° 39' Long. Acet. 75° 04' E. Wind from N. W. to W. N. W. up to noon. P. M. wind W. N. W. Ship running to the E. N. E. before it ; 8 P. M. W. S. W. ; Bar. 29.54, Simp. 29.46 ; lost topmasts, and boats, and ship in great distress, the main hatchway being stove in. Midnight wind still more violent.

15th April.—A. M., water gaining on the pumps. Wind W. N. W. blowing extremely hard ; ship making 5' per hour to the E. N. E. ; 4 A. M. Bar. 29.56, Simp. 29.34 ; 10 A. M. Bar. 29.50, Simp. 29.4 ; wind and sea most furious ; Lat. Acet. 8° 6' N. ; Long. Acet. 76° 10' E. P. M. wind W. S. W. ; 4 P. M. S. W. At 5 P. M. Bar. 29.53, Simp. 29.36 ; 8 P. M. Bar. 29.56, Simp. 29.38. Heavy squalls thunder and lightning.† Midnight Bar. 29.64, Simp. 29.40.

16th April.—Wind S. W. ; 2 A. M. Bar. 29.70, Simp. 29.52 ; 4 A. M. gale abating, and at 8 A. M. Barometer gradually rising. Noon, weather moderate. Lat. Acet. 7.44 N., Long. Acet. 76.53 E.

* It is mentioned in a separate note that the Simpiometer had been as low as 29.66 since the 2d of the month in calms off the Maldives.

† Noted for the first time in the log since the 13th at midnight.

Abridged Log of the Ship Buckinghamshire, Capt. McGREGOR. From the Government, and from the Chamber of Commerce of Bombay (Civil time.)*

The Buckinghamshire was at noon, 14th April, 1847, in Lat. $8^{\circ} 18' N.$; Long $72^{\circ} 56' E.$; Bar. 20.85, Simp. 29.84, Ther. 81° . P. M. strong breeze and cloudy from N. W. by N.; at 1.30. Minicoy bore E. N. E.; 4 P. M. wind marked Northerly, and increasing. At 1 P. M. Bar. 29.72. 2 P. M. Bar. 29.72, Simp. 29.74, Ther. 83° . 3 P. M. Bar. 29.72, Simp. 29.75, Ther. 84° . 4 P. M. Bar. 29.70, Simp. 29.69. 5 P. M. Bar. 29.67, Simp. 29.69. 6 P. M. wind N. b. E. 8 P. M. fresh gale, heavy sea from the S. E. and heavy squalls from the North; dismally dark, with the most vivid lightning. 7 P. M. Bar. 29.71, Simp. 29.71. 8 P. M. Bar. 29.70, Simp. 29.72. 9 P. M. Bar. 29.75, Simp. 29.76, Ther. $80\frac{1}{2}^{\circ}$. 10 P. M. wind N. E. b. East. Midnight fresh gale, constant rain and lightning. To 9 P. M. ship standing to the N. E. and E. b. N. and then to the N. W. and N. N. W.

15th April.—At 4 A. M. Bar. 29.67, Simp. 29.71, Ther. $80\frac{1}{2}^{\circ}$. 6 A. M. Bar. 29.71, Simp. 29.74. Daylight fresh gales N. E. b. E.; severe squalls and a heavy sea; ship standing to the N. b. W. to noon, when Lat. Obs. $9. 1. N.$, Long. $73.4. E.$, Bar. 29.67, Simp. 29.72, Ther. $81\frac{1}{2}^{\circ}$. P. M. wind N. E.; ship standing to the N. W.; Bar. 2 P. M. 29.64; at 4. 29.64; at 6, 29.71; at 8, 29.72; at 10, 29.73; midnight 29.69. Simpiesometer and Ther. 2 P. M. 29.72, and 81° at 4; 29.71, and 81° ; at 6, 29.71, and $81\frac{1}{2}^{\circ}$; at 8, 29.71, and 81° ; at 10, 29.73 and $81\frac{1}{2}^{\circ}$; midnight 29.70 and $81\frac{1}{2}^{\circ}$.

16th April.—A. M. strong gale N. E. b. N. and at noon a hard gale from the same quarter; ship standing to the S. E. b. E. Bar. $2\frac{1}{2}$ A. M. 29.58; at $4\frac{1}{2}$, 29.51; at 6, 29.51; at 8, 29.60; at 10, 29.58; at noon, 29.53. Simpiesometer and Ther. at $2\frac{1}{2}$ A. M. 29.60, and $80\frac{1}{4}^{\circ}$; at $4\frac{1}{2}$ A. M. 29.55 and 81° ; at 6, 29.54 and 81° ; at 7, 29.61; at 8, 29.63 and 81° ; at 10, 29.61 and 82° ; at noon 29.57 and $81\frac{1}{2}^{\circ}$. Lat. by Acct. $8.44 N.$, Long. marked as $73.3, E.$ P. M. wind N. E. b. N., fresh gales and rain, with a high sea. 3 P. M. wind North; 5, N. b. W. $\frac{1}{2}$ W.; 9, W. N. W. Sunset hard gale. Midnight hard gales, constant light rain, and lightning to the northward. [N. B. wind now was about West, being marked W. S. W. at 2 A. M.]

* There are a few more details in the one than in the other, and I have inserted what was essential from both, with notes from Capt. McGregor's private Log.

Vessel standing from $3\frac{1}{2}$ knots to the E. S. E. to 8 knots to the N. E. b. E.

17th April.—2 A. M. wind W. S. W. ; Bar. 29.58 ; Simp. 29.60 ; Ther. $81\frac{1}{2}^{\circ}$; daylight fresh gale, S. W. by S. 8 A. M. South ; 9, S. West-erly. Course from N. E. to N. $\frac{1}{2}$ E., 8 to 9 knots. At 8 A. M. set the main topgallantsail. Noon fresh gales ; Lat. $10^{\circ} 20' N.$; Long. $75^{\circ} 5' E.$ P. M. ship running 11 and 12 knots to the N. N. W. ; wind S. b. W. $\frac{1}{2}$ W. ; strong gales, thick weather and furious squalls.

18th April.—To noon, ship running as before, 11 and 12 knots to the N. N. W. and N. W. b. N. ; 2 A. M. in maintop gallant sail ; by day-light passed the Mermaid with ensign inverted ; threatening weather and all the glasses falling ; but their register lost. Noon, gale increasing ; wind marked S. E. at 11 A. M. Noon Lat. ascertained from Capt. McGregor's log $14^{\circ} 10' N.$; Long. $72^{\circ} 59' East.$ Gale increasing to an extraordinary degree, maintopsail blew away ; kept the ship before it. P. M. cut the foresail from the yard ; foretopsail blew away ; at 0.30 P. M. ship broaching to, cut away the mizenmast and kept her before it. Blowing a hurricane, maintopmast blew away, foremast *bending** to its force ; 1 P. M. foremast went and a furious gust *blew away the mainmast* near the deck. The quarter boat blew away, the large cutter flying across the poop. The violence of the wind indescribable, every thing exposed to its fury being blown away. The poop ports having blown in the violence of the wind blew down the Cuddy bulkheads, destroying the Barometers and every thing in all the cabins ; a very high sea on, covering the ship with spray. The ship labouring excessively and every thing on all the decks adrift and destroyed, cargo as well as stores, as far as could be seen ; crew unable to stand on their legs or to hear one another, and exposed to great danger from the stunning force of the wind. The fore and main and mizen masts got under the ship's bottom, at the same time, endangering the rudder ; all violently tearing off the copper.

At 2 P. M. the wind, which had been for the last half hour inde-scribably furious, fell suddenly calm ; but the Sympiesometer indicated no favourable change, continuing as low as 28.08. During the calm got the whole of the wreck cut clear away ; ship covered with aquatic birds, thousands of them dying on deck. 4 P. M. the hurricane that had died away at E. S. E. commenced with equal violence at

* This is a remarkable indication of the extreme fury of the wind. It would appear from what follows that both (sound) masts were *blown out* of the ship while scudding 12 knots ! The expressions used are those of the log.

W. N. W. ; the ship became again enveloped in the sea, and labouring with extreme violence which nothing could resist. Hurricane abating at 10 P. M. Sympiesometer 28.96, wind still from the West. The carpenter having gone down the pump-well found $3\frac{1}{2}$ feet water in the ship. Midnight more moderate ; Sympiesometer 29.10 ; ship's head to the S. S. E. with the wind from the westward.

19th April.—Daylight moderate winds from the westward with rain ; ship unmanageable, with her head to the S. E. ; sounded in 30 fms. and shortly after sighted the Vingorla rocks bearing N. E. $\frac{1}{2}$ E., Noon squally. At 7.30 P. M. came to in $9\frac{1}{2}$ fms. off the rocks of Vingorla. *Abridged Log of the Ship Faize Rubany, Capt. SARGEANT, from Bombay to China. Civil Time. From the Government of Bombay.*

The *Faize Rubany* was at noon 14th April 1847, in Lat. $12^{\circ} 57'$ N., Long. $75^{\circ} 16'$ E., by her log worked back from the 16th with moderate breezes from the westward up to midnight.

15th April.—A. M. breeze declining to calm at noon, with a confused sea, when in Lat. $11^{\circ} 55'$ N., Long. $76^{\circ} 08'$ E., by account back from the 16th as before. P. M. wind S. E. b. S. ; hazy weather, ship standing to the southward against a heavy head swell and sprung the mainmast at 6h 30 ; to midnight blowing strong with a high sea.

16th April.—A. M. to noon, wind variable to the S. E., moderate gale and very high sea. Noon Lat. $11^{\circ} 19'$ N., Long. $75^{\circ} 32'$ East. P. M. wind E. S. E., strong gale, high sea, ship pitching very deep ; 7 P. M. wind veering to eastward ; 9 P. M. east ; midnight hard gale, veering towards the S. E.

17th April.—A. M. wind S. E., very heavy gale, with tremendous high sea ; 6 h. A. M. having been struck with a very heavy sea, found the ship making water ; 7 A. M. bore up before the wind to the N. N. W. noon very hard gale, Lat. Acct. $11^{\circ} 35'$, Long. $74^{\circ} 54'$ E. ; P. M. wind S. S. E., heavy gale and violent squalls ; 8 P. M. S. E. to midnight.

18th April.—3 A. M. broached to, damaged the rudder and till noon ship in great distress,* lying to from 7 A. M. Blowing excessively hard from the S. E. Lat. Acct. 13.24 N., Long. $74^{\circ} 27'$ E. P. M. wind south. At midnight less wind ; sounded in 30 fms.

19th April.—Daylight made the land between Cape Ramos and George's Island ; noon at anchor, in Lat. $15^{\circ} 19'$ N., off the coast about this part.

* At 6 A. M. the ship *Mermaid* passed her.

Abridgment of a journal of the Ship Mermaid, signed by her commander Capt. J. B. ROGERS, and officers; the Log Book being lost with her. (Civil time.)

The ship *Mermaid* was bound down the coast, and having sprung a leak was finally beached a letter below Vingorla.

16th April.—P. M. ship standing to the S. E. with the sea breeze, in from 18 to 26 fms. At 5 P. M. Mangalore east 8 miles. Midnight fresh land breeze and hazy.

17th April.—A. M. Barometer 29.84; by 8,30 fresh gale and squalls. At noon an increasing hard gale about S. E. in 35 fms. Bar. 29.60; No observation. Vessel leaky; 3 P. M. Bar. 29.50, 1 to 5 wind S. E.; 6 South; at 4h cut away mizenmast. 4h 30 put back for Bombay; 5 P. M. Bar. 29.42, heavy gale and cloudy, ship running to the N. W. and N. W. b. N. to midnight.

18th April.—A. M. Heavy gale with thunder, lightning and rain. 4 A. M. Bar. 29.36. Noon 29.34, and in 28 fms. water. No observation. P. M. steady fresh gale W. S. W., ship running to the N. N. W. $4\frac{1}{2}$ and 5 knots. Barometer 29.38. Sunset passed a large ship (the *Buckinghamshire*,) Bar. 29.38; by 6 P. M. wind W. by S.; severe squalls, thunder, lightning and rain; midnight in 29 fms.

19th April.—A. M. More moderate; 4 A. M. wind west, and at noon obliged to beach the ship for the safety of lives and cargo.

A letter from the Collector of Mangalore, forwarded by the Bombay Chamber of Commerce, says that—

“The gale set in on the 16th from the S. W. or regular monsoon quarter, and was at first supposed to have been an unusually early commencement of the rainy season. *It continued for about three days,** accompanied with torrents of rain, veering round, at particular points of the coast, to all quarters of the compass.

Extracts from various logs of coasting vessels. From the Government of Bombay.

The ketch *Ceylon Island* was on the 12th April within 25 miles of Colombo, but was blowu off by a smart gale from E. S. E. She then stood in for Colombo, and on the 15th (Nautical time) got the wind blowing “tremendously” from S. E., which on the 16th blew away her topmasts and all her sails, while running before it to the N. W. This continued on the 17th, also from S. E. On the 18th, Lat. Obs. 9°14. N.

* Italics are mine.

19th severe gale about S. W. and very heavy sea. Vessel running to the N. W. b. N. Indifft. observation 11.11 N. 20th. Heavy S. W. gale ; Lat. $12^{\circ} 42'$, North.

The *Pattamar Labsavoy* was off Faizud (Zyghur?) river on the 17th. On the following day it commenced blowing hard from the East, and in the middle of the day the wind blew in a heavy gale with a tremendous sea ; at 5 P. M. the wind shifted to the S. E. with heavy rain. We were then at anchor near the river and put in for shelter.

A lascar of the Pattamar Townully, from Alleppee, states, that on the night of the 17th, when near Dewghur, they experienced a heavy gale which commenced from the east and on Sunday morning they put in to Radjapore river.

Abridged Log of the Bombay Steam Navigation Companys Steamer Victoria, from Bombay to Colombo. (Civil time.) From the Government of Bombay and Chamber of Commeree.

16th April 1847.—The *Victoria* was at 3.45 A. M. with Mangalore Light bearing East. At 8 all possible sail with wind easterly, and at noon a fresh southerly wind and cloudy weather with a heavy swell. Lat. Obs. was $12^{\circ} 15'$ N. and Mount Dilly bearing S. E. b. S. P. M. to midnight wind S. Easterly and E. S. Easterly ; at 10 P. M. anchored off Cannanore. Heavy swell, surf increasing and continued rain from the S. E.

17th April.—Increasing surf. Wind about E. S. E. and increasing, by 4 A. M. surf breaking over the vessel and large rollers striking her heavily ; $6\frac{1}{2}$ A. M., stood out to sea. Wind E. S. E. Bar. 29.75 ; stood out S. S. W. till 9 A. M. Noon, gale increasing. Steamer *Hugh Lindsay* in company. 2 P. M. Bar. 29.70. Threw some cargo over board. Heavy gusts of wind, and constant rain ; wind S. S. W. 10 P. M. Bar. 29.68. Midnight strong S. W. b. S. gales and tremendous sea.

18th April.—A. M. wind southerly, strong gales ; Bar. 29.70. 8 A. M. moderating ; noon fresh breezes South. Bar. 29.90. ; P. M. heavy squalls again from S. S. W. ; swell increasing.

19th April.—A. M. hard squalls ; wind S. E. 6 A. M. wind S. S. W. 4 A. M. in 15 fms. water ; 8 A. M. Mangalore flagstaff S. E. b. E. 11 A. M. engines making only six revolutionis per minute and side rods bent ; came to off Mangalore in 6 fms. water. Noon hard squalls. On anchoring found a strong set to the northward. Winds Southerly. Midnight Bar. 29.92 ; strong Southerly squalls.

20th April.—Wind was S. b. W. ; at noon W. S. W. ; at 2 P. M. got under way for Cannanore, and at midnight she still found the current setting strong to the northward.

The ship Atiet Rohoman, Capt. S. Steward, lying at Alleppee. Civil Time, from the Chamber of Commerce.

On 14th at 5 P. M. came to with the flagstaff bearing E. by S. 3'. Wind E. S. E. ; 15th 2 A. M. heavy squalls from S. S. E. ; 8 A. M. wind easterly. Noon moderate at N. E. b. E. ; 2 P. M. N. E. b. E. ; 4, E. N. E. ; 6, East ; 10, E. S. E. ; 12, S. E. moderate breezes and drizzling rain. Midnight dark and cloudy.

16th April.—Cloudy and rain to noon ; 2 A. M. wind S. S. E. : 4, S. E. ; 6, E. S. E. ; 8, East ; 12, E. N. E. ; 2 P. M. wind east ; 4, E. S. E. ; 8, S. E. ; midnight E. S. E. having increased to a strong breeze with heavy squalls.

17th April.—To noon the same wind from E. S. E. to S. E. and South ; 2 P. M. S. b. E. strong gales, rain and heavy sea ; 4 P. M. S. S. E. to S. E. b. S. ; 12, S. E. ; midnight heavy gusts and sea.

18th April.—More moderate, noon dirty weather, wind S. b. E. ; 6, South ; midnight S. S. E. after which the ship shifted her birth further in shore.

No Barometric observations are given.

Abridged Log of the H. C. Steamer Sesostris, Captain CARLESS, from Aden to Cannanore, with troops. Civil time. From the Government of Bombay.

16th April.—A. M. wind N. N. E., N. by E., and N. N. E. again ; ship running east 7 and $7\frac{1}{2}$ knots per hour ; a long S. Easterly swell. Noon, Lat. $13^{\circ} 15' N.$ Long. $70^{\circ} 28' E.$ P. M. wind N. N. E. Course the same to midnight. Lightning to the eastward, and vivid lightning to the eastward and southward are noted.

17th April.—1.40 A. M. taken aback by a hard squall from the East. Soundings 1 to 2. 17 fms. to 30, no ground ; to noon. Wind N. E. to North, N. N. E., and E. N. E. at noon, when Lat. Acct. $13.28 N.$, Long. Chr. $72.7\frac{1}{2} E.$, 1 P. M. wore to N. W. Wind N. E., stood back to midnight, going from 1 to 3 knots ; moderate gale and heavy sea with hard squalls.

18th April.—Daylight decreasing breezes 8 A. M. stood again to the E. N. E., wind being from N. N. W. A. M. to 7 A. M., and North to

noon when Lat. $13^{\circ} 52'$ N. Long. $71^{\circ} 13'$ P. M. squally from North, and at 6, W. N. W., with heavy swell throughout.

19th April.—Squally weather, with winds from W. S. W. and W. N. W.; noon Lat. 13.28 , N. Long. $73^{\circ} 14'$. Gradually making sail and standing in for Cannanore.

At the Laccadive Islands.

By an account obtained from Capt. Young of the H. C. Steam Frigate *Auckland*, and published by Captain C. Biden, Master Attendant at Madras, in the *Madras Spectator*, it appears that at Minicoy the gale was not very severe, but at Kalpeni and Underoot, where it is stated to have been most violent from the S. East, the sea made a fair breach over the Islands, and about 250 of the inhabitants were swept away, all the cocoanut trees uprooted or cut asunder by the violence of the storm.

I now add a Log of much interest, as will be subsequently shown, being that of the H. C. S. *Essex*, in June, 1811.

HURRICANE OF THE H. C. S. ESSEX.

Abridged Log of the H. C. S. Essex, Capt. NISBETT, 3rd to 6th June, 1811. Reduced to Civil time.

The H. C. S. *Essex* bound to Bombay, was on the 3rd June at noon in Lat. $16^{\circ} 38'$ N., Long. by Chr. $69^{\circ} 32'$ E., with light breezes from the north and fair weather. P. M. the same, freshening with cloudy threatening weather, and “*a high confused agitated sea breaking in all directions*”;* 5 P. M. wind N. E.; 10 P. M. lightning to the S. W.

4th June.—1 A. M. wind N. N. E.; 5 A. M. striking topgallant yards. and pitched away the foretopmast. 7 A. M. increasing to a hard gale. Hove too under bare poles. 9 A. M. wind marked N. E.; noon, hard gales; thick haze, much lightning and heavy rain; Lat. Acct. $16^{\circ} 19'$ N., Long. Acct. $70^{\circ} 12'$ P. M. wind about N. N. E.; at 6 P. M. about N. b. E. blowing a hurricane to midnight.

5th June.—1 A. M. lost main and mizenmasts. 5 A. M. the wind (hitherto about N. by E. from the ship's coming up and falling off) shifted suddenly to N. W., and at 8 A. M. to W. S. W., also in a sudden shift with a tremendous squall. Ship quite ungovernable. By noon moderate; P. M. wind marked W. S. W., and at 4 P. M. clearing up.

From the best consideration I can give to the log of this vessel, aided by a private letter to me on the subject of the flaws and shifts

* The italics are mine, I shall allude to this passage in the remarks.

of wind in hurricanes, by the late Mr. Greenlaw, in which this hurricane is described, I should assign to it a track of about from the S. S. E. to the N. N. W., but it may have been half a point more or less one way or the other; for as usual, it was found, I suppose, impossible (and we thought it in those days of no consequence, as most now do) to note with any exactness the wind before the shift; which I have deduced from her coming up and breaking off. This storm however, occurring as it did within so short a distance of that of the *Cleopatra's* under consideration, is a full confirmation, if any doubt could exist of the tendency of the tracks to follow a parallel line with the coast, and thus affords us, with the present storm a most valuable guide for the future estimates of tracks in this very frequented sea.

In reference to what is here said of the tracks and of their apparent tendency to follow the line of the coasts, it would appear that at Bombay also, as well as farther South, they certainly at times do so; for on the 14th June 1837, a most severe and destructive hurricane was felt at that port, in which the losses in property alone were computed to amount to twenty-five laes of rupees, some fifteen or sixteen vessels being driven on shore in the harbour and many of them totally wrecked, besides numbers of native craft and boats. It is stated to have been the most severe storm experienced for half a century. It is said that the wind which began to blow "a gale" from the East, veered to S. E., at which point it increased to a "perfect hurricane," which lasted for an hour, and then *shifted** to S. S. W., from which quarter it continued to blow "with extreme violence" during the greater part of the day till it abated.

The foregoing is abridged from the newspaper accounts, and is distinctly a hurricane, with the shift from S. E. to S. S. W., which would indicate a track from S. 12° East to the N. 12° West, and I have so placed it on the Chart.

I now place in a tabular form the wind and weather experienced by the different vessels in the *Cleopatra's* hurricane from the 13th to the 17th April, so as to enable the reader to see at a glance the winds and weather on any particular day, and shall follow it with the details of the data and considerations from which the track of the storm is laid down on the Chart.

* This word is always important, for it marks the passage of the centre without a calm interval.

Comparative Table of Winds and Weather from the 13th to the 17th April, 1847, and from Lat. 7° to 15° N., and Long. 71° to 77° E.

Date and Time.	Name of Ship or Station.	Lat. N.	Long. E.	Winds and Weather.	Bar.	Ther.	Simp.	Remarks.
Noon, 13th April 1847.	East London.	7.21	73.34	N. W. b. W. through-out; strong squalls contant rain and heavy head sea. Gale at midnight with heavy squalls, thunder and lightning.	29.8	....	29.66	Barometer falling from 29.74 at 2 P. M. to 29.68 at 10 P. M. Simp. 29.62 to 29.54.
	Buckinghamshire.	6.53	70.45	P. M. fresh and variable breezes. N. by W. to W. N. W.	....	....	....	Studding sails set. Midnight squally, rain & lightning.
Noon, 14th April.	East London.	7.39	75.64	4 A. M. hurricane from N. W. Wind N. W. to W. N. W. to Noon. P. M. W. N. W. to W. S. W.	29.5	....	29.38	4 A. M. Bar. 29.5; Simp. 29.4. 8 P. M. Bar. 29.54 Simp. 29.46.
	Buckinghamshire.	8.18	72.56	A. M. increasing breeze and fine. W. N. W. to N. by W.; 2 P. M. strong breeze and cloudy from N. W. by N. Midnight fresh gale from the northward.	29.85	81°	29.84	1 P. M. Bar. 29.72; 9 P. M. 29.75; 2 P. M. Simp. 29.74; 9 P. M. Simp. 29.76; 6 P. M. vivid lightning.

Date and Time.	Name of Ship or Station.	Lat. N.	Long. E.	Winds and Weather.	Bar.	Ther.	Simp.	Remarks.
	Faize Robany, . . .	12.57	74.20	P. M. moderate breezes from the westward to midnight.	.....	.....	.....	At 5 P. M. anchored at Alleppee.
	Atiet Rohoman at Alleppee,	.....	.....	Wind E. S. E. fine, ..	.....	.....	.....
Noon, 15th, April.	East London, . . .	8.06	76.10	W. N. W. blowing extremely hard. Noon most furious; P. M. W. S. W.; 4. S. W. 5	4 A. M. 29.56 10.29.50 P. M. 29.53 8. .56 12.—.64	..... .....	29.34 29.40	Thunder & lightning, noted for the first time since the 13th.
	Buckinghamshire,	9.1	73.4	A. M. Fresh gales N. E. by E.; P. M. N. E.	4 A. M. 29.67 Noon 67 P. M. 2 h. 29.64 Midt. 69	80½ 81½	A. M. 29.71 — .72 P. M. 29.72 — .70	P. M. Ship standing to the N. W.
	Faize Rubany, . . .	11.55	75.04	Noon calm and confused swell. P. M. Wind S. E. by S.; from 6 P. M. blowing strong with high sea.	.....	.....	.....	Ship standing to the southward.

Atiet Rohoman, at Alleppec, .....	.....	2 A. M. heavy squalls S. S. E. 8 A. M. E. Noon moderate, N. E. by E.; 4 E. N. E.; 6 East; Noon S. E. Moderate and drizzling rain. Midnight dark and cloudy.		
Noon, 16th April. East London,	7.44	76.58	A. M. wind S. W.; 4 A. M. gale abating. Noon moderate. P. M. wind S. W. by W.	At 8 A. M. Barometer gradually rising.
Buckinghamshire,	8.44	73.3	A. M. strong gale N. E. b N.; noon hard gale; P. M. the same; 3 P. M. wind N., 5 N. b W. $\frac{1}{2}$ W.; 9 W. N. W. Midnight, about West, hard gales, thunder and lightning.	Vessel first standing to the E. S. E., and then running 8 knots, to N. E. b E. Barometer not marked P. M.
Faize Rubany,	11.19	75.32	To noon moderate gale, variable to S. E. with heavy sea; P. M. E. S. E. strong gale; 9 P. M. East. Midnight hard gale, veering to S. E.	Very heavy sea throughout.

Date and Time.	Name of Ship or Station.	Lat. N.	Long. E.	Winds and Weather.	Bar.	Ther.	Simp.	Remarks.
	Mermaid,.....	....	....	At midnight fresh breeze and hazy,	....	....	....	At 8 P. M. Mangalore East. N. B. This ship's log being lost with her, the notes are from a journal only.
	Victoria Steamer,	12.15	....	At 3 A. M. Mangalore Light East; 8 Wind Easterly; P. M. continued rain from the S. E.	....	....	....	10 A. M. anchored off Cannanore.
	Atlet Rohoman, at Alleppee,	9.30	76.24	S. S. E. to East, and S. E. Midnight increased to strong breeze with heavy squalls.	....	....	....	Ship running to the East 7 & 7½ knot
	II. C. Steamer Sestrois,	13.15	70.28	A. M. wind N. N. E. P. M. N. N. E.	....	....	....	A long S. Easterly swell. Lightning to East and S. Eastward.
Noon, 17th April.	Buckinghamshire.	10.20	75.5	2 A. M. wind W. S. W.; daylight fresh gale, S. W. by S; 8 A. M. S. 9 S. W.; 8 P. M. S. by W. ½ W., Strong gales, thick weather and furious squalls.	2. A. M. 29.58	81½	29.60	No log of the East London this day, she having fair weather.

Faize Rubany, . . .	11.35	74.54	The wind S. E., heavy gale. P. M. S. S. E. 8 P. M. wind S. E. Very hard gale and tremendous squalls.	. . . .	. . . .	Very heavy sea throughout; sprung a leak at 6½ A. M.; 7 A. M bore up to the N. N. W.
Mermaid, . . . . .	. . . .	. . . .	Noon increasing hard gale, about S. E. to 5 P. M., S. E; 6 South.	A. M. 29.84 Noon. 60 3 P. M. 50 5 P. M. 42	. . . .	4 P. M. cut away main mast. Ship had put back and was running to the N. W.
Victoria Steamer at Cannanore,	11.52	75.26	4 A. M. wind E. S. E. and surf increasing; 6h. E. S. E. Noon gale increasing; 2 P. M. heavy gusts and constant rain. Wind S. S. W. Midnight strong S. Westerly gales.	P. M. 2.29.70 10h. 68	. . . .	At anchor at Cannanore, and standing to sea at 6½ A. M.
Atiet Rohoman, at Alleppee,	9.30	76.24	To noon strong breeze and squalls, E. S. E. to S. E. and South 2 P. M. S. by E.; 12 S. E. Midnight heavy gusts and sea.	. . . .	. . . .	Standing back to the N. W.
H. C. Steamer Sesostris.	13.28	72.7	Wind North to E. N. E. at noon; P. M. N. E. Moderate gale and heavy sea.	. . . .	. . . .

<i>Date and Time.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. E.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Ther.</i>	<i>Simp.</i>	<i>Remarks.</i>
Noon, 18th April.	Buckinghamshire.	14.10	72.59	Blowing a hurricane; and at noon wind marked S. E.; 2 p. m. reached the centre with the wind at E. S. E.; at 4 W. S. W.; abating at 10 p. m.	....	....	2 p. m. 2.28.00 10.28.96 midnight 29.10	0.30 p. m. lost mizen-mast; 1 p. m. lost foremast and main-mast; 2 p. m. Calm hull, 4 p. m. hurricane from W. S. W. Daylight on the 19th moderate from the W.
	Faize Rubany,....	14.23	74.27	A. m. blowing very hard from S. E.; p. m. South.	....	....	....	Ship in much distress; midnight less wind, and in 30 fathoms off the coast; 19th at daylight at anchor in Lat. 15° 19' N.
	Mermaid,.....	....	....	A. m. heavy gale, thunder and lightning; p. m. gale W. S. W. 8 p. m. W. by S. severe squalls, thunder and lightning.	A. M. 4.29.36 Noon 34 P. M. 29.38	....	....	On 19th a more moderate; ship having sprung a leak, was beached for the safety of all on board.

Victoria Steamer,	....	....	A. M. wind Southerly, strong gales. Noon fresh breezes South. P. M. heavy squalls again from S. S. W.	A. M. 29.70 Noon 90	....	....	8 A. M. moderating. Noon fresh breezes, P. M. again squally, as also on 19th, when she anchored at Mangalore.
Atiet Rohoman at Alleppee,	9.30	76.24	More moderate. Wind S. by E., South and S. S. E.	....	....	....	Shifted her birth further in shore.
H. C. Steamer Seosttris,	13.52	71.13	Decreasing breeze. 8 A. M. N. N. W. and North to noon; P. M. squally; North to W. N. W.	....	....	....	On 19th, in Lat. 13° 28', Long. 73° 14', and steaming in for Cannanore.

The following are the views and data upon which I estimate the places of the centres of the storm for the different days, as I have placed them on the Chart.

The first Logs we have are those for the 13th April, on which day, or rather at midnight, between the 13th and 14th with the *East London* a gale is stated to have fairly commenced, which by 4 A. M. is called a *hurricane*, from N. W.,* which by noon of the 14th had veered to W. N. W.

Now, at noon of the 14th, this ship had the *Buckinghamshire* about 145 miles to the W. N. W. of her, with nothing more than a strong breeze from N. W. b. N., and the *Atiet Rohoman* at anchor at Alleppee, 140 miles to the North Eastward, with an E. S. E. breeze, and fine weather. If the *East London's* was at this time a rotatory storm, we must then infer it to have been one of small extent, since its centre would have been about N. E. from her, and have thus been at about half the distance between her and Alleppee, if only 140 miles in diameter; but it evidently did not reach that anchorage. If we call it then one of this class for this day, and suppose it the commencement of that of the following days, it did not exceed, if it reached to 100 miles in diameter; and indeed the only fair grounds we have for doing so are the regularity of fall of the *East London's* Barometer, and the gradual veering of the wind from N. W. to W. N. W. and W. S. W. on the 15th.

On these grounds, then, I have marked for this day, the 14th, a small dotted circle, (as being somewhat doubtful,) of 100 miles in diameter, and which leaves still a space of 45 miles to the anchorage of Alleppee, and of 110 miles to the position of the *Buckinghamshire*, which vessel had but a strong breeze and cloudy weather, and her Barometer yet as high as 29.72 at 1 P. M. Indeed, I am much inclined to take this N. W., W. N. W., and W. S. W. gale as nothing more than a strong precursor of an early monsoon, the tendency to North Westerly winds in March and April on this part of the coast being well known,† and

* This vessel was in much distress from leaks, and evidently was a bad sea boat, but she lost only a foretopmast, with small spars and sails, and repeatedly, (as far as can be inferred from her very incomplete log) hove to and bore up; which shows that the weather allowed her to remain quite manageable, and was by no means at hurricane force.

† Horsburgh, Vol. I. p. 524. The report from Mangalore to the Bombay Chamber

as will be seen, on the 15th it must have been a storm travelling *in* towards the coast from the W. S. W., and breaking up immediately, if it was one *on the 15th*.

To dispose then first of the *East London's* storm. We find that this vessel had run in 72 miles towards Cape Comorin, to the E. N. E., from noon 14th, to noon 15th, and that her N. W. gale of the 14th had veered to W. N. W., and at P. M. on the 15th it was W. S. W., "blowing furiously."

This would give the centre of a true rotatory storm as bearing N. N. W. from her; but if one, it must have been of much smaller dimensions than that of the 14th, since at this time, (though at 2 A. M. it had blown in heavy squalls from the S. S. E.) at Alleppee, it was then moderate, at S. E. with drizzling rain; and the *Buckinghamshire* 175 miles to the N. W. b. W. of the *East London*, had fresh gales at N. E., and at midnight her Barometer rather rising than falling; though this might have been the effect of her standing, though but slowly, to the N. W. I am then inclined to think that, if this storm of the *East London's* was rotatory, and not as before suggested the precursor of the monsoon, that it was of still smaller extent to-day, and just terminating; and that it was moreover so nearly stationary that it only made the short distance which I have marked for it, of 42 miles in the 24 hours, and this to the E. N. E.,* and all this is very conjectural, for a veering of 6 points in 36 hours, when approaching a high shore, and from the quarter from which the incoming monsoon is expected, is not conclusive evidence for its rotatory character; and the storm of the ketch *Ceylon Island*, which in Lat. 7° , when between Long. 79° and $77^{\circ} 30'$, and on the 16th and 17th, had a smart *Easterly* gale can form no part of this of the *East London's*, for it must have been to the Southward and Eastward of her on those days, when (on the 16th) the *East London* had the wind at S. W. off Cape Comorin, and moderating by

of Commerce, states that the first effects of the gale on the 16th, were from the S. W., and were supposed there to be an early setting in of the monsoon.

* This is quite against the usual track of our Indian storms, but such tracks do undoubtedly occur on the Western Coast of Australia, and I suspect of South America. See the "Sailor's Horn Book of Storms, for all parts of the world," just published. The proofs of hurricanes being often nearly stationary for a time, are numerous. See XI. Memoir in this Journal, Vol.—

noon of that day. The position of the ketch is moreover altogether too uncertain for us to consider her Log of any importance, except as showing that extensive atmospheric disturbances existed as far as the coasts of Ceylon before the commencement of the great hurricane; and it seems to be, at least in the neighbourhood of coasts and in the Eastern hemisphere, a sort of rule that these violent hurricanes are preceded either by this sort of general disturbance, as at changes of the monsoon, or by long and oppressive calms.

For the *Buckinghamshire* on this day, 15th April, we find, as before mentioned, that she had fresh gales from the N. E. b. E. with severe squalls, and her Barometer still high—while the *Faize Rubany*, at 210 miles to the N. E. of her, close in with the shore, had it calm, with a confused swell only, which by 6 p. m. had changed to blowing strong from the S. E. b. S., with a high sea. By noon this day, therefore, we cannot allow that there are any fair grounds for assuming that the *Buckinghamshire's* storm had commenced with her, nor that the *East London* and *Buckinghamshire* had any parts of the same storm, for a circle of 100 miles only in diameter would have reached Alleppee from the position it must have occupied to give the *East London* a gale at W. b. S., and it would have required one of 340 miles to have reached the *Buckinghamshire*.

It is barely possible, that her N. E. b. E. gales, which had been splitting her (old?) sails during the night, and the heavy S. E. sea which is noted at 9 p. m. on the 14th, were the effects of a circular storm, of which the centre must have been to the S. S. E. of her, but not at any great distance, for then it would have reached the *East London*. The foregoing would place the centre of the vortex for that day a little to the eastward of a line joining the head of the Maldives and Minicoy, and agrees with the report of the commander of the *Auckland* from the latter island, that the gale was not very severe there, which it would have been if fully formed on this day, for it must then have passed up very close to it.

On the 16th of April we may fairly assign a position to the centre of the storm, which was now undoubtedly formed, and at noon was with the *Buckinghamshire* a hard gale from N. E. b. N. with a high sea, veering to North, N. b. W., and W. N. W., and finally to about West at midnight; while with the *Faize Rubany* it was a moderate gale

from the S. E. to the East. The other ships, *Mermoid*, *Victoria*, and *Atiet Rohoman* from which we have logs on this day, were wholly out of the circle of the vortex.

For the place of the centre; it must also have been close to the *Buckinghamshire*, as the rapid veering of the wind from N. E. by N. to West at midnight, or 13 points in 12 hours, shows. Indeed, a projection of her track on a plane chart would make her to have run round the North-western, Western and Southern quadrants of the storm circle, at a distance of perhaps 30 or 40 miles, between noon and midnight, while it was rapidly passing up on a Northerly course ahead of her. Hence we cannot place it at a greater distance than 50 miles S. W. by S. from the *Buckinghamshire*'s position at noon this day, or close to the Island of Minicoy.

It is very doubtful if the *Faize Rubany*'s "moderate gale," though it would agree very well as to the direction of the wind, was any part of the storm on this day; for if we assume it to be so, we must first take it that the whole storm was of upwards of 480 miles in diameter, and then that it should have been blowing tolerably strong at Alleppee, where the *Atiet Rohoman* was lying with the wind at E. N. E., (instead of about S. S. E., which this position of the centre requires); and though with dark, cloudy, rainy weather, yet with so little wind that she crossed royal yards at 8 A. M., and did not send them down till the evening. This supposed storm circle would also reach the *East London* at its outer verge, but it would then require the wind to be S. $\frac{1}{2}$ W., and about the same strength as with the *Faize Rubany*; whereas it was with the *East London*, though moderating, still a smart gale from S. W. b. W. We may, it is true, presume that the two ships on the coast were sheltered by the mountains inland, but there was nothing to alter the direction of the wind with the *East London*, and five points is too great a discrepancy to allow of our considering this ship's storm as part of the *Buckinghamshire*'s.

I am therefore inclined to take the storm of this day as having just formed, or just travelled up from the Southward, and having a diameter of 100 or 150 miles at most, and that the dark weather and heavy rain of the *Atiet Rohoman* were the joint effects of the verges of the *East London* and *Buckinghamshire*'s storms, and we may finally remark that if the storm was then of 480 miles in diameter it would probably

have been much more violent near its centre. Hence I have given it only 150 miles of diameter for this day, differing herein from Capt. Carless, who in his remarks, while he agrees nearly with me as to position of the centre, thinks it may have extended to the *Faize Rubany's* position, but he had not seen the log of the *East London*, which doubtless would have altered his opinion.

For the 17th of April.—We have on this day the Logs of the *Buckinghamshire*, *Faize Rubany*, *Mermaid*, and *Victoria* steamer, to the right, or eastern side of the path of the storm, and the *Sesostris* on the left or North Western quadrant; and the winds and weather of these vessels agree fairly enough in placing the centre about 10 miles to the North, and on the meridian of Underoot Island. The diameter of the storm (that is the hurricane portion of it,) I should estimate to have been not more than 250 miles, which allows it to reach to the anchorage of Cannanore, where the *Victoria* was riding with a strong gale, which obliged her to slip and go to sea with the wind at E. S. E., veering to S. S. W. at 8 P. M. as the storm passed up; for at this time the breeze which the *Sesostris* had cannot be considered, as to strength, as forming any portion of a hurricane, though it was in the right direction, and in fact indicating a distant one by the swell.

On the 18th April we have the *Buckinghamshire* at noon in Lat $14^{\circ} 10'$, Long. $72^{\circ} 59'$ by Acct., and having been running up with the hurricane for the whole 24 hours! She was now so close upon its centre that at 2 P. M. when about 15 or 20 miles to the North West of this position, she had reached the calm at the centre, which would thus be in about Lat. $14^{\circ} 22'$, Long. $72^{\circ} 47'$ at that time or a little to the S. E. of it at noon. This position differs again from that given by Captain Carless, but I had the advantage of seeing Capt. McGregor in Calcutta, who handed me his private Log, and he stated that he thought the ship's run was over-estimated in the Log Book. Captain Carless further says that the *Buckinghamshire* while running to the Northward had a current of two miles an hour in her favour. I do not know, but suppose he assigns this as the rate of the storm wave and current? though he does not expressly say so; for Horsburgh says that there is but little or no current in March and April, except with N. W. winds, which give a little drain to the Southward. Our position it is true places the *Buckinghamshire* 102 miles from Vingorla, and that of Captain Carless' sketch chart at 35 miles only from

that port; but Captain Carless has omitted to note that the *Buckinghamshire* had $29\frac{1}{2}$ hours of drifting and sailing (a part of it in a hurricane too) before she anchored at 7.30 P. M. on the 20th off Vingorla. Perhaps her true position was at about 60 or 70 miles from that port, for 102 miles is a long distance for a disabled ship to make; but 35 miles would have indubitably drifted her on shore with the Westerly hurricane, gale, and breezes, she had (using these words to express the strength of the wind) from the time of her dismasting to daylight on the following day. If we take it that for the last 24 hours the storm wave was carrying her 3' per hour, this would about place her, in addition to her log, at 60 miles from the port; but we cannot assume this at pleasure; and if we place this ship 72 miles further north, we make the winds experienced by the others much more at variance than they are.* The *Mermaid* and *Faize Rubany* were both so close in with the coast that their winds, which should be about S. W. b. S. to S. S. W., are marked South with the latter vessel, and W. S. W. with the *Mermaid* just after noon; but these can be scarcely considered as the true direction, as the gale with them must have been influenced on the coast side by the high land; and to the westward the *Sesostris* had but a moderate gale from the northward, so that we may take fairly about 220 to 230 miles as the full diameter of the storm, and perhaps not above 180 as that of the true hurricane part of it, for the *Mermaid* and *Faize Rubany*, though in severe weather and much distress, had nothing approaching to a furious hurricane, and indeed the *Mermaid* must have foundered if she had had such weather.

On the 19th April, the weather appears to have moderated, and we have no farther authentic traces of this storm. Capt. Carless indeed alludes to bad weather in the Gulf of Cutch, experienced by the H. C. Surveying Schooner *Taptee*, and he states that on the 19th considerable magnetic disturbance was noted at Bombay, when the winds also varied considerably, but nothing like a gale was felt. The Barometer on the 17th and 18th was very little affected, and on the 19th, at 4 P. M. was lowest, with a strong breeze at N. E., so that we cannot assign any further track to our hurricane, which it is probable may now have been

* Why there is at one time a strong storm wave, and at another, in the same seas and seasons none, we cannot yet say, but I have no doubt there is this anomaly.

lifted up and (if the Cutch storms were any renewal of it) have again descended there,* as a moderate though still circular-blowing gale.

Rate of travelling.—Having thus settled the track of the storm, we have to investigate its rates of travelling. It will appear from the Chart that these are as follows :—

	<i>Track. Distance. Rate p. hour.</i>	
	<i>Miles.</i>	<i>Miles.</i>
Noon 16th to Noon 17th April N. 8° E.	180	7.5.
17th..... 18th N. 15° W.	220	9.2.

This last track does not agree with the shift experienced by the *Buckinghamshire*, which was from the E. S. E. to the W. N. W., and which would give a track of N. 22° E. ; but first, ours is an *average* track for the 24 hours, and next the ship was drifting about for two hours in the calm centre,† so that we cannot say to which part of it she was carried. We must also take into account her being just dismasted, with both masts hanging to her side and beating under her bottom, which had to be cut away : and when life and death were hanging on the successful execution of this duty, it may fairly be doubted if the direction of the wind was correctly noted, or rightly recollected by any one ?

The track given for the H. C. S. *Essex* is, it is true, laid down from her shifts of wind also ; but this was an immediate shift or rapid veering without any calm interval, and it took place five hours after she was dismasted, and the wreck was cleared from the sides quickly after the accident ; she had besides the complement of six officers, which the Company's China ships in those days carried, and thus there can be little doubt that her winds are correctly given where marked, and that the track of her hurricane is to the N. N. W.

The rates of travelling of the *Cleopatra's* hurricane are quite within the limits at which our Indian hurricanes have been shown to progress, and do not call for any particular remark.

* In my new work I have, I think, shown satisfactorily, that hurricane storms are mere disks of from 3 to 10 miles in height, and that it is much more than probable that they are formed above and descend ; and we have instances on land, though not at sea, of their rising up and re-descending.

† Taking the calm to have lasted two hours and the hurricane to be moving on, as we have seen, at the rate of 9.2 miles per hour this gives about 18½ miles for the diameter of the central calm space.

The early epoch at which this storm occurred is worth noticing for future guidance. Horsburgh, p. 523, Vol. I. note, notices "a heavy storm from the Southward, on the 20th and 21st of April, 1782, on most parts of the coast, in which H. M. S. *Cuddalore*, the *Revenge*, and several other ships foundered with their crews, and others were dismasted," and he says that "since that time no others have occurred so early in the season, but at the latter end of April and early in May some have suffered by S. W. and Southerly gales," which may have been the setting in of the monsoon. He mentions also, p. 529, a S. E. gale at Bombay, in November, 1799, veering to the Eastward, and blowing a hurricane for some time, in which ships were wrecked in the harbour. If this was a true circular storm, it would have a track coming in from the W. N. W., and adverting to my remarks in the note at page 45, on the possible track of the *East London's* gale, it is not, I think, wholly impossible that this may have occurred.

Remarks on the lesson afforded by these hurricanes.

It is singular that we have here again, as in the case of the loss of the *Golconda* troop-ship, in the China sea, (Fourth Memoir, Jour. As. Soc. Vol. IX.) three lessons of the highest importance from a single storm! We have the *Sesostris* steaming back out of the bad weather, between the 17th and 18th. The *Essex* in 1811, and the *Buckinghamshire* in 1847, running headlong into the centre, and in imminent peril of foundering; and finally, the *Cleopatra*, which vessel there is every reason to believe, (see Part II.) must have committed the same error, and has been destroyed.

If warnings like these are not listened to, it is difficult to say what will be required. Nothing short of the destruction of a whole fleet would seem sufficient to rouse the attention of those whom it behoves to insist upon the laws of our science being as duly attended to as the lead and the chart, and upon every Commander intrusted with public property noting in his log his reasons for standing on or heaving to on the approach of bad weather; and this will, in case of his return to port in a disabled state, at once show if he understood his position or not. If he did not, he is unfit for the command of a vessel till he does.

PART II.

Considerations on the Loss of the Cleopatra Steamer, and for Steamers in the Eastern Seas in general.

The object of the whole series of these memoirs being not only the investigation of the scientific questions which they elucidate, but also the preservation of life and property as promoted by the research, I make no apology if in this section I go into some few technical details which in truth are as scientific, though not so little known or understood, as the wonderful and mysterious phenomena which a hurricane always presents. We fulfil but half a duty if we neglect to enforce on such occasions as these the plain common sense lessons (homely though they be thought) which arise out of the facts before us.

For European readers it may be necessary to state that the *Cleopatra* was one of the E. I. Company's War Steamers, of about 800 tons; her power is not given in the replies to my queries. She would however, it is stated, go 9.6 and 10 knots with a good *fair* 7 knot breeze for a merchantman, and 5 knots *against* such a breeze, and from 3 to 4 and 6 knots according to the sea when close hauled with trysails, in a close reefed topsail gale for a merchantman. She is said to have been 8 years old, and to have been docked in December 1845, well furnished with pumps and some worked by the engine as usual. She was considered a good sea boat, and it is only stated as "*very probable* that her Commander had any of the new works on storms on board."*

The *Cleopatra* left Bombay with convicts for the Straits settlements, having altogether about 250 souls on board, on the 14th April, 1847, at 1.55 P. M., the time given for her having cleared the harbour. She

* It will be understood that these statements are all from the replies to my queries. From this last phrase, it is clear that she was sent to sea without any thing positive being known on the subject! and it is to me quite probable that she had not; for since 1839, that the science has been in every way, both at home and in India, urged on the attention of nautical men (the very newspapers in India, and the *Bombay Times* amongst others constantly recurring to it) we have till 25th Aug. 1847, the date of Captain Carless' remarks, from a service numbering I believe 150 or 200 officers and midshipmen, not a single word or line of report or remark published or forwarded anywhere, and moreover every application for information utterly disregarded! This is grievous truth for English sailors to read, but it had better be told than hidden or slurred over, because human life must very often, and even the honour of our flag, *may* sometimes, depend upon the progress we make in this, as in all other branches of nautical Meteorology.

was, it is said, not deeper *than usual*, nor leaky. I do not know, but presume that she would have touched at Point de Galle for coal; but nevertheless we may fairly suppose that her coal and provisions brought her as low as possible.

Capt. Carless, who knew the vessel and had every opportunity of information on the spot as to probable winds and weather, and the route she would have followed, thinks she would have passed down midway between the Easternmost Laccadive Islands and the coast. He supposes her average speed up to noon of the 16th "could not have exceeded 7 knots." This would place her then in about Lat. 13°. And he then considers that "she may have made to the next day 4½ knots." This would place her at midnight, between the 16th and 17th, 54 miles to the S. S. E. of this position, or more probably due South of it, as she must have made much leeway from noon, and as I shall now show; was probably before midnight unmanageable, and at that time involved in the centre. I have therefore chosen the conjectural track laid down for her at this time. We can only in cases like this conjecture the unknown from the known, and before I proceed, I am desirous of adverting to two well known instances of Steamers running headlong into hurricanes, and by the avowal of the commanders, escaping only by a sheer miracle, and we put aside, for the sake of argument, the remote probability of the *Cleopatra's* having been destroyed by fire, or lost through a mutiny on board, because there would be in such cases so many chances of one boat at least escaping.

The first of these instances is that of the *Great Western Steamer*, in October 1846, which vessel indubitably steamed into the Southern side of a hurricane, and apparently into or close to the centre. Though I have only a newspaper account of her distress, yet it seems evident that this fine vessel, though built to cross the Atlantic, was *next to unmanageable*, and nearly swamped when in the central portion of the hurricane! In the same storm a Royal Mail Steamer slackened her speed on the approach of the hurricane and at the proper time bore up and ran round the heel of the storm with a fair wind!

The next instance is one in our own seas, and very closely resembles the *Cleopatra's* probable case. It is that of the H. C.'s War Steamer *Pluto*, which vessel left Hong Kong on the 27th June, 1846, bound to Borneo, to join H. M. squadron under Rear Admiral Sir Thos.,

Cochranc. The *Pluto** steered down on a S. b. Westerly course, and in the face of every indication, ran headlong, about noon on the 29th, into the centre of a terrific Tyfoon, coming up, like that of the *Cleopatra's*, from the S. S. E., in which she lost her masts, rudder, *funnel*, &c. &c., and drifting back was nearly wrecked on the rocks of Hong Kong. And she also was, as may be supposed, nearly or totally unmanageable in the tyfoon from the excessive violence of the wind, and her engines being utterly powerless contend with the sea.

Now, from analogy* we should judge that the *Cleopatra* was probably no great sea boat in a hurricane, whatever she might be in a common gale,† and that the *Pluto's* history was pretty nearly hers, namely that on nearing the centre she became unmanageable, and lying in the trough of the sea, went over and was swamped, and probably lost her funnel before this took place, which accident alone, if it occurred, would give rise to the other contingencies.

And this last accident, the loss of the funnel, I allude to very pointedly, because I think it one very likely to happen. My query on this head to the Bombay authorities is as follows:—

“10. *How was her funnel secured, i. e. how many shrouds and stays, and of what material and size were they? as nearly as can be stated.*”

The reply is, “*Properly,*” and I forbear to remark on its brevity; but I assume it as my sailor readers, and landsmen also, will I think construe it to mean “*Properly for an ordinary gale: can't say as to a hurricane?*” for this query might indubitably have been answered in full detail from the dockyard and work shops, and within a trifle as to correctness.

* I do not allude here to the loss of the *President*, though she also was steaming into a hurricane circle when last seen.

† The reply to my query on this head alludes of course to common gales, but even of these, how unfair to the eye of a seaman, is the estimate which is formed of Steamers in this respect under all the usual circumstances. Their engines keep them to the wind and sea at the very best angle for meeting it, and the steamer is called a good sea boat. When the engine gives way, or has no longer sufficient power, or the fires are swamped, we find the greater part of the steamers forthwith in distress, often when a smart merchantman would be “taking it easy” under her storm staysails, or close-reefed maintopsail. By the log of the *Semiramis*, a sister-boat I believe to the *Cleopatra*, in this very hurricane, though she had but a capful of wind, with a high confused sea, yet she had all hands (troops on board) pumping and baling! We must then take the words “a good sea boat,” with the addition of “*while her engines can help her,*” for most of our sea-going steamers as yet.

And it is impossible, I think, for any seaman who knows what an Indian typhoon or hurricane is, to look to the cobweb rigging of any of the sea-going steamers, and the entire absence of all pendants, or eye-bolts to which a preventive shroud or tackle can be attached, and to believe that, when laid down with their lee gunwales in the water, and in a hurricane, in which, to quote the words of Capt. Doutty of the *Runimede*, an experienced old West India commander (*Journal*, Vol. XIV. p. 365,) *the severity of the wind is beyond description, there is nothing to compare it to, for unless present, no one can conceive the destructive power and weight of wind, crushing every thing before it as if it were a metallic body,** these iron towers can stand half an hour?

I do not forget that a steamer has not the heavy masts and yards of a sailing vessel to lay her over in a hurricane, but on the other hand, her light spars would at most be equivalent to juremasts in the wind and sea of a typhoon; and she would labour as heavily as a ship without masts for the want of top weight to steady her. This difference is well known and calculated upon by ship-sailors, who, while it will stand, I fancy always prefer a close-reefed maintopsail to lie to under, "to keep her steady?"

And there is a farther danger, which evidently has never been thought of, which is that at the very height of these terrific tempests the funnel must stand as it can, by its own strength, for it has no support from the rigging, till it has laid far enough over to wrench itself out of the deck! This will startle many, but is easily shown. In harbour the iron shrouds are all slack, to allow of the expansion and lengthening of the funnel by the heat. In practice also the funnel, I am informed, is fitted slightly loose in its socketting to allow of the lateral expansion: Now if it contracts while the vessel is laid down in a hurricane the whole weight of it must hang on the shrouds or depend on the strength of the materials.

Now when the spray and "rain as cold as ice,"† is beating upon it, the temperature must be much lowered, but if the fires are put out by the sheer impossibility of keeping them in, or by the water in the engine room; it is clear that the funnel then must contract a little and the

* There is no exaggeration in this. It has occurred again and again in our tyfoons and hurricanes. The late Mr. Greenlaw, in the letter alluded to at page 36, says of the hurricane of the *H. C. S. Essex*, that he felt that if he had fallen down he should have remained as if nailed to the deck when the ship rolled to windward!

† Capt. Rundle's Log, *Journal A. S.* Vol. XIV. p. 33.

shrouds become slack exactly when most wanted to be taut. I have little doubt that this was one reason of the loss of the *Pluto's* funnel.

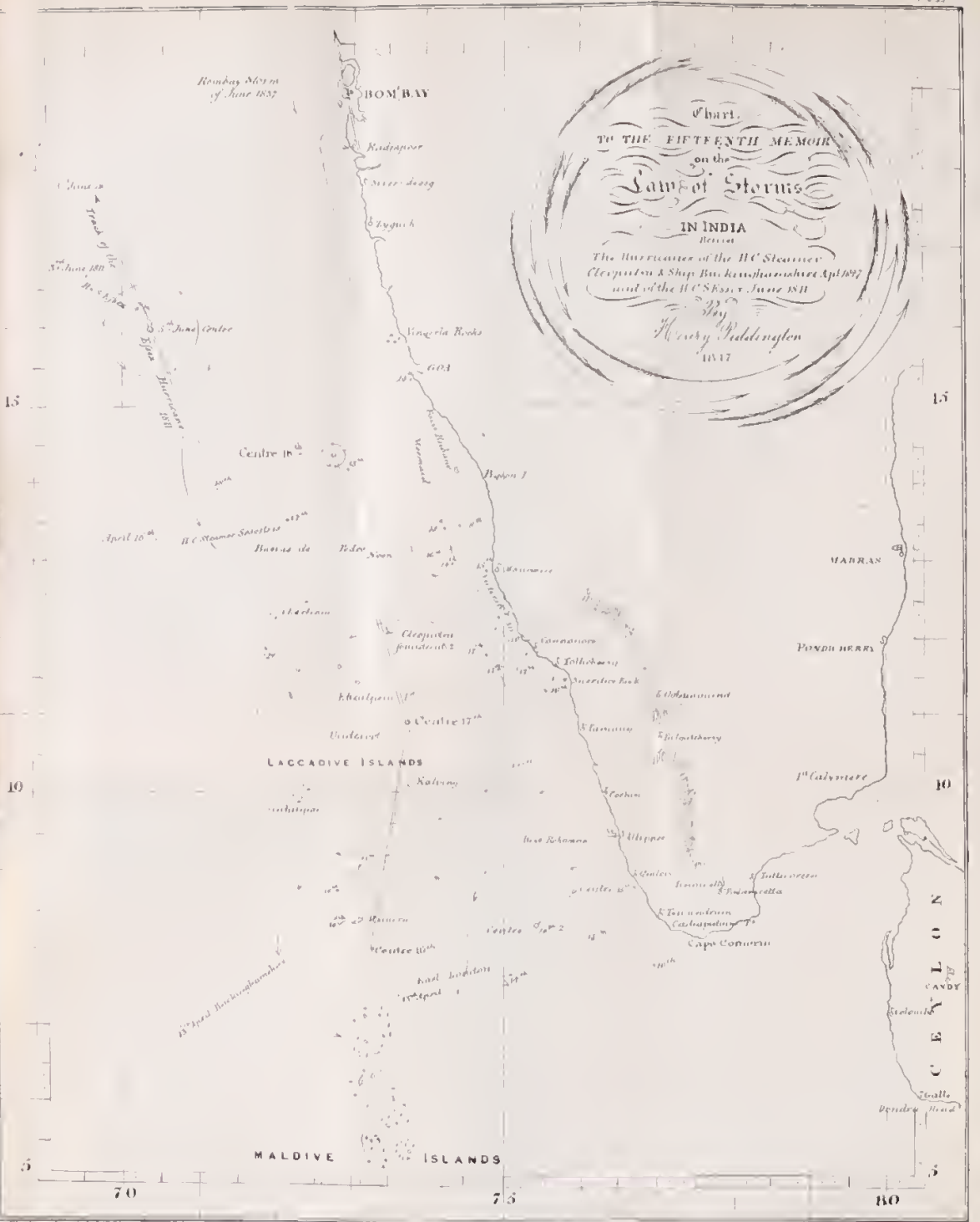
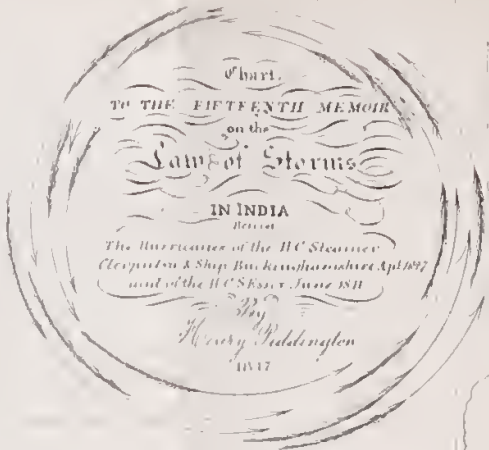
I do not advert here to the large openings necessarily left in Steamers, farther than to say that unless much more strongly covered in than a common hatchway, their being stove in by a sea is not an unlikely but even a probable accident, serious as it would be. And this seems to have attracted attention at home, for in a recent notice of the improvements in H. M. Steam Ship *Fury*, of 1123 tons, and 550 horse power, I find it stated that "she is fitted with circular hatches over her engine-room, which in warm climates throw open its whole area to the currents of air from the deck;" and it is added that "This plan also affords the most perfect security in a gale of wind, preventing the shipment of seas in the engine-room."

If this was thought necessary in a first rate steamer for the storms of the Channel, the Atlantic, and the hurricanes of the West Indies, and doubtless sanctioned by the Admiralty because much *insecurity* had been found in heavy weather on the old plans, we may fairly doubt if, for our seas, where, we may say without exaggeration of some of our hurricanes and tyfoons, that nothing made of wood or iron or rope can hold against them; we have got much yet to learn in the art of properly securing our steamers' funnels and hatches, so as to avoid the dismal repetition of the *Cleopatra's* loss—with a freight other than of convicts.

And the remedy for this is so simple that I think (after another catastrophe or two) it will not fail to be adopted; i. e. to have a stout hoop with strong eyebolts and chain pendants, the whole of workmanship and stoutness sufficient to bear the whole weight of the funnel when the vessel is upon her beam ends, fitted to the head of the funnels. Stout runners and tackles, like the lower tackles of ship's foremasts, should be kept ready rove, and upon the approach of severe weather these should be carefully set up.

There is nothing in this but the precaution which every good officer takes with his lower masts, in tackles, preventer shrouds, &c. in a sailing vessel; and the loss of a funnel or of both of them, is an accident of too grave a kind to be thought lightly of, because it may seldom happen. My belief is that under the present system it may probably *always* happen in every Steamer that becomes unmanageable in a tyfoon.

Round Bay
of June 1857



Printed and Sold by Wm. Clowes and Sons, London.

Extract from a Memoir of some of the Natural Productions of the Angami Naga Hills, and other parts of Upper Assam, by J. W. MASTERS, Esq. (Communicated by G. A. BUSHBY, Esq., Secretary to the Government of India.)

GEOLOGICAL SPECIMENS.

I saw very little that appeared to me interesting in Geology on the Angami Hills; scarcely any thing but sandstone, of different degrees of compactness, from soft and friable, to hard.

The following specimens will show the nature of the rocks met with on the route.

1. This is a fragment of one of the sandstone pillars in the old fort of Dhimapura. For a description of the pillars, see Captain Butler's Journal.

2. Fragment of a sandstone rock from the N. E. side of Samujading. A great portion of the hill is composed of this description of rock.

3. Fragment of a more compact stone found on the top of Samujading. Many large blocks of this description are lying loose on the summit of the hill.

4. Fragment of a tombstone from Samujading. The four show the different kinds of rock that are to be met with at Samujading and along the banks of the Dibbu. No rocks or stones are found in the bed of the Dhanseri, between Gologhát and Dhimapura, except such as flow out of Dibbu Mookh.

5. Fragment of foliated clay slate, of which the hill of Prephinia is composed. This specimen was procured from a ravine below the village, where the strata are nearly perpendicular. The rock differs in compactness at different points; when exposed to the action of the air, it crumbles down with the least touch; at other points where protected, it is more compact like the specimen, and large flags may be procured.

6. Fragment of one of the rocks common at Mazamuh. Of this description of rock the terrace walls are formed in the ricefields. These are the only kinds I observed on the Angami hills. I saw no Iron, Salt, Coal or Lime.

COAL.

The following specimens of Coal were collected from the different localities mentioned below :

7. Coal from the Jamuná falls, highly impregnated with sulphuret of iron, and liable to spontaneous combustion. The spot from which this specimen was procured is about half a mile above the falls, and five yards from the Jamuná river. The seam is eighteen inches thick. The sample alluded to in the Coal Committee's report for 1845 section 39, and said to be "one of the purest and finest Coals hitherto met with anywhere," was a detached piece of Coal picked up by Mr. B. Wood, among the rocks at the falls; from whence it came has not yet been ascertained.

8. Coal from the Diphu Nadi, 8 miles above the falls of the Jamuná. The seam is 2 feet 5 inches thick.

9. Coal picked up in the bed of the Sundrá in the Lakhanapura district. Small bits of coal are found scattered over the bed of the river from the mouth of the Jeeling to beyond the first range of Duphla hills. No trace of any seam or accumulation in any part of the river visited.

10. Coral formation from the bed of the Sundrá.

11. Coal from Jayapura. Jayapura is the only known coal locality to which boats can have free access without risk or obstruction. In the Desairy there are stiff rapids to be encountered below the coal of Borhát. In the Suffry the rapids are more numerous and the navigation more difficult than in the Desairy. In the Dikho there are upwards of 20 small rapids, between the Santuk Mukha and the coal.

LIME.

12. Fragment of a large block of shell Limestone from the falls of the Nambin; very plentiful.

13. Fragment of a large block of compact Limestone from the falls of the Nombar.

14. Fragment of a Limestone boulder from the bed of the Hurrio Ján.

15. Limestone boulders from Sunapura. These are found thinly scattered over the numerous quartz and granite boulders in the bed of the Brahmaputra above Noa Dihing Mukha. They appear to be

brought down by the Digaro, as they are more numerous near the mouth of that river.

16. Limestone boulders from a little below the Khúnd. As we ascend the river, the boulders become larger, some of them consisting of pure white Marble.

IRON.

17. Clay from Golághát, containing granular Iron Ore.

18. Sulphuret of Iron from the Jamuná falls.

MISCELLANÆE.

19. Pipe Clay from the Námbar falls.

20. Pipe Clay from the Jamuná falls.

21. Fragment of a rock near the hot spring. *Burra Noong poong.*

22. Fragment of a rock at the Námbar falls.

23. Fragment of a rock forming a rapid in the Hurrio Ján.

24. Fragment of a rock on the Tokapháng Naga hills.

25. Fragment of a rock at the Jamuná falls.

26. Fragment of a rock on the Mikir Hills.

27. Fragment of a rock on the Mikir Hills, Jamuná falls.

28. Sandstone from the first hill banks of the Sundrá river. Clift nearly perpendicular.

29. Sandstone from a high clift about 3 miles above No. 28.

30. Conglomerate forming faults ? in the high clifts of Nos. 28 and 29.

31. Fragments of Granite boulders from the bed of the Sundrá.

32. Fragment of the rock at the Brahma Kunda.



Examination and Analysis of the BALL COAL of the Burdwan Mines,
by HENRY PIDDINGTON, Curator Museum Economic Geology.

The Museum is indebted for this specimen to D. Williams, Esq. the Government Geologist, who informs me that these singular balls are very common in the Burdwan mines, though I am not aware that they have ever been noticed before. He says they are of all sizes, from that of a Cannon ball, to a man's head, and even 18 inches in diameter.

Like the Burdwan, and many English kinds of coal, these balls are composed of alternate layers of a bright bituminous and a dull jetty kind of coal, splitting easily between the layers. Our specimen was

found very tough and difficult to cut with a saw. There was no difference between the centre and the periphery of the ball, nor any thing that could give the idea of a nucleus or of concentric layers.

And upon considering it attentively it will be seen at once that it is nothing more than an oblique rhomboidal prism of the common coal of the mines, rounded *somehow* into a rough ball. So far, for the present as to its external characters.

I find its specific gravity to be 1.37. The mean of 5 specimens* of Burdwan Coal is 1.365. I place here its analysis and the mean of the first six specimens referred to in the note below.

Analysis of the Ball Coal. Mean of Burdwan Coal.

Mr. Prinsep's Table.

Water,	5.00	.....	7.4.
Volatile matter,.....	29.00.	.....	35.6.
Carbon,.....	57.00.	.....	52.5.
Ash,	9.00.	.....	12.2.
	—————		
	100.00.		

There was a slight excess in my analysis; no doubt due to the peroxidation of the Iron.

I had not, from Mr. Williams, any note of the particular mine from whence our ball was taken, so as to compare its analysis with that particular coal, but from its agreeing so nearly, we can have little doubt of its having the same origin as the average of Burdwan Coals. But then comes the curious question of "*How did it become rounded and deposited in the coal bed after it was a rhomboid of coal?*" for the total absence of any concentric layers or other trace or indication of organisation, leaves no doubt about its having been one. It is in fact such a rounded boulder of somewhat tough coal as we should expect to meet with in a stream of moderate velocity—with its layers parallel to the base of the prism.

I fear this must remain, like so many other geological questions, matter of conjecture; for the imagination is almost startled at the idea of the time required for coal to be formed, and then broken up and carried off in boulders to be deposited again in new beds forming at a distance: as we might suppose the Mississippi to be now rolling lumps of coal with its huge rafts of timber and mighty masses of vegetable matter,

* From the first six in Mr. Prinsep's Table; Journal, Vol. VII. p. 197.

to deposit them amongst beds of coal forming (if any are so,) in the Gulf of Mexico! Yet to this conclusion we come; nor is it easy to imagine any process by which these balls could have been formed but that of rolling. If they were homogeneous throughout we might suppose them imperfect crystals; if with concentric layers, or a nucleus, that they were derived from some particular vegetable production; and finally, if coal was a rock exposed to the air, that, like granite, the crystal or mass had been weathered, and not *worn* down at the corners. It evidently *is* worn; and correct information as to how these balls are found *in situ* with every particular regarding them, would be highly acceptable. I do not here advert to the theory of coal being a purely mineral deposit, as it has been found in so many points untenable against that of its having a vegetable origin, at least so far as relates to bituminous coal.

H. P.

P. S. Since this paper was written I have obtained a copy of Mr. Homfray's second pamphlet on the coal field of the Dummooda, and Adji, in which that gentleman, an able and experienced miner, who gives one of the localities has noticed these balls (p. 26) in the following terms:—

“ We proceed westward and come to China Coory, where only $7\frac{1}{2}$ feet of the vein is worked as good; further west we cross the Barracar river, and the Coals in almost every locality are of a much better quality than those from the eastern division; those near to Pachete Hill are good and very bright. We come then to the Coodeah nullah, running into the Barracar river, and there the coals are very superior, and it is from some of those little localities about there that the vein produces Coal, which as I before said, yields a fair third rate coke; the vein is thicker and the Coal much brighter, but more tender, and contains a vast quantity of round balls of Coal, as though large lumps had been submitted to the attrition of a running stream; this is found when the vein of Coal exhibits no symptoms of derangement save these nodular balls, which are generally the size and shape of a Dutch Cheesc. Without doubt the Coal at this part of the country is the best for all purposes.”

It is evident that Mr. Homfray, considers them as I do, as blocks of coal rounded by water. How could this happen, and their subsequent deposition in another Coal bed, without their having belonged to a Geological era preceding all the present supposed ones!

*The Land Shells of the Tenasserim Provinces, by Rev. F. MASON, A. M., Corresponding Member of the Boston Society of Natural History, U. S.**

Being requested, a few years ago, by a distinguished American Conchologist, to send him some land and fresh water shells, I subsequently collected every species I could find in the Provinces, and transmitted specimens of each to America, where they were examined by my correspondent, and nearly *forty* species pronounced new. Most of them may be found characterised, or described, in the Proceedings or Journal of the Boston Society of Natural History.

Dr. Gould wrote me that he had furnished his correspondents in London and Paris with specimens of all the new shells I had sent him ; but on a recent visit to the Museum of the Asiatic Society, I could not find a single specimen of our Tenasserim land shells. It has therefore occurred to me that a Catalogue of all the land shells I have noticed in the Tenasserim Provinces, with a few brief notices of each, might not be unacceptable to the readers of the Journal ; and whenever I fall in with my collections again, I shall endeavour to furnish the Museum with specimens of each species.

The Genus *Helix* is the most abundant in species ; there being *nine* at least, and all new.

H. procumbens, Gould, is a flat discoidal shell, with four whorls, the outer one deflected. "Diameter $\frac{3}{4}$ of an inch ; height $\frac{1}{4}$ of an inch. Belongs to the group of which *H. planulata* is the type."*

H. infrendens, Gould, is a small orbicular shell with three oblique teeth. "Diameter $\frac{2}{3}$ of an inch ; height $\frac{1}{3}$ of an inch. Very closely allied to *H. rangiana*, Fer."

H. anceps,† Gould, is a fragile shell with six whorls. "Diameter $\frac{7}{10}$ of an inch ; height less than $\frac{2}{3}$ of an inch. In general form, color, and sculpture, it resembles *H. acies*, Fer. (*acutimargo*, Rosm.) but is much smaller, and not widely umbilicated."

H. honesta,‡ Gould, is a small thin shell with five whorls. "Dia-

* As Mr. Mason has been good enough to furnish us with specimens of some of the shells enumerated in the present paper, we are enabled to identify several of these with species already described by Benson and others.—EDS.

† *H. serrula*, Benson.—EDS.

‡ *Nanina vesicula*, Benson.—EDS.

meter $\frac{9}{20}$ of an inch ; height $\frac{1}{4}$ of an inch. Resembles *H. fusca* more than any other species I have seen. It is probably a *Nanina*."

The above four species are remarkable for being found on the branches of the Peepul, and other species of the Genus *Ficus*. This is so characteristic of these snails, that the Karens call them Kló-khleu, *Ficus shells*.

H. saturnia, Gould, has five whorls, and is the largest species of the genus that we have on the coast. "Diameter 2 inches ; height $\frac{1}{4}$ inch. In size and form it is like *H. lampas* from Jamaica ; but differs especially in having a broad, deep umbilicus."

H. refuga, Gould, is a sinistral shell with a depressed spire, six whorls, and deflected aperture. The Karens do not distinguish it from the *Planorbis*. "Diameter $\frac{3}{5}$ of an inch ; height $\frac{1}{5}$ of an inch. This remarkable shell is almost exactly like *H. carabinata*, Fer., except that it is reversed, and has no lamellæ revolving within the outer lip."

H. Caracolla zabata, (Gould,) has a carinated periphery and very deep umbilicus. It is most abundant during harvest, and hence the Karens call it Kló-bú, *the paddy shell*. "Diameter $\frac{4}{5}$ of an inch ; height less than $\frac{2}{5}$ of an inch. Much like *H. scabriuscula* in form and aperture, but quite different as to surface, color, and umbilicus."

H. Caracolla retorsa,* Gould, is a large sinister shell ; called by the Karens Kló-búphan, *the paddy blossom shell*, because most abundant when the paddy comes into flower. "Diameter $1\frac{3}{4}$ inches ; height 1 inch. This large heterostrophe *Helix* resembles an inverted specimen of one of that group of shells, so common and so varied, from the Philippine Islands, of which *H. lamarkii* is one. Young specimens might, at first glance, be confounded with *H. himalana*, Lea ; but the *himalana* is much more globular, the surface less striated, the carina quite indistinct, and the umbilicus smaller."

H. (Streptaxis) petiti, Gould, is a distorted little shell, with a spire of seven whorls. The Karens call it Kló-beú, and Kló-phong, *the coix shell*, from its resemblance to the seed of a species of *coix* with which they adorn their garments as a substitute for beads. "Length $\frac{2}{5}$ of an inch ; breadth less than $\frac{3}{10}$ of an inch. In size and exterior, it closely resembles *S. aberrata*, (sou-leget,) but is rather larger."

* *H. interrupta*, Benson.—Eds.

The genus *Cyclostoma* has three representatives in our Tenasserim jungles.

C. tuba, Sowerby, is more common, perhaps, than any other species.

C. pernobilis,* Gould, is also very abundant. It is the largest land shell in the country, and the largest species of its genus.

The Karens call it Kló-mú-pghà, *the primary shell*, i. e. the one from which others are derived. The Burmans call it Khó-rú-quet, *the Quet shell*; as they say it calls out *Quet, quet!* Nearly all the different species of *Helix* above are called by the Burmans varieties of the Quet shell. "Diameter 2 inches; height 1 inch. This superb species is a little larger than any one hitherto described. The *C. involvulus*, Sowerby, is a miniature of it."

C. sectilabrum, Gould, has an elevated spire with eight whorls. "Length 1 inch; breadth $\frac{1}{4}$ of an inch. Closely resembles *C. altum*, Sowerby, but has the fissure across the peritreme on the opposite side. *C. croceum*, Sowerby, may be only a faded specimen of this shell."

We have three species of *Bulimus*. One, a small red species, Dr. Gould thought to be new, but hesitated, and he has not therefore described it.

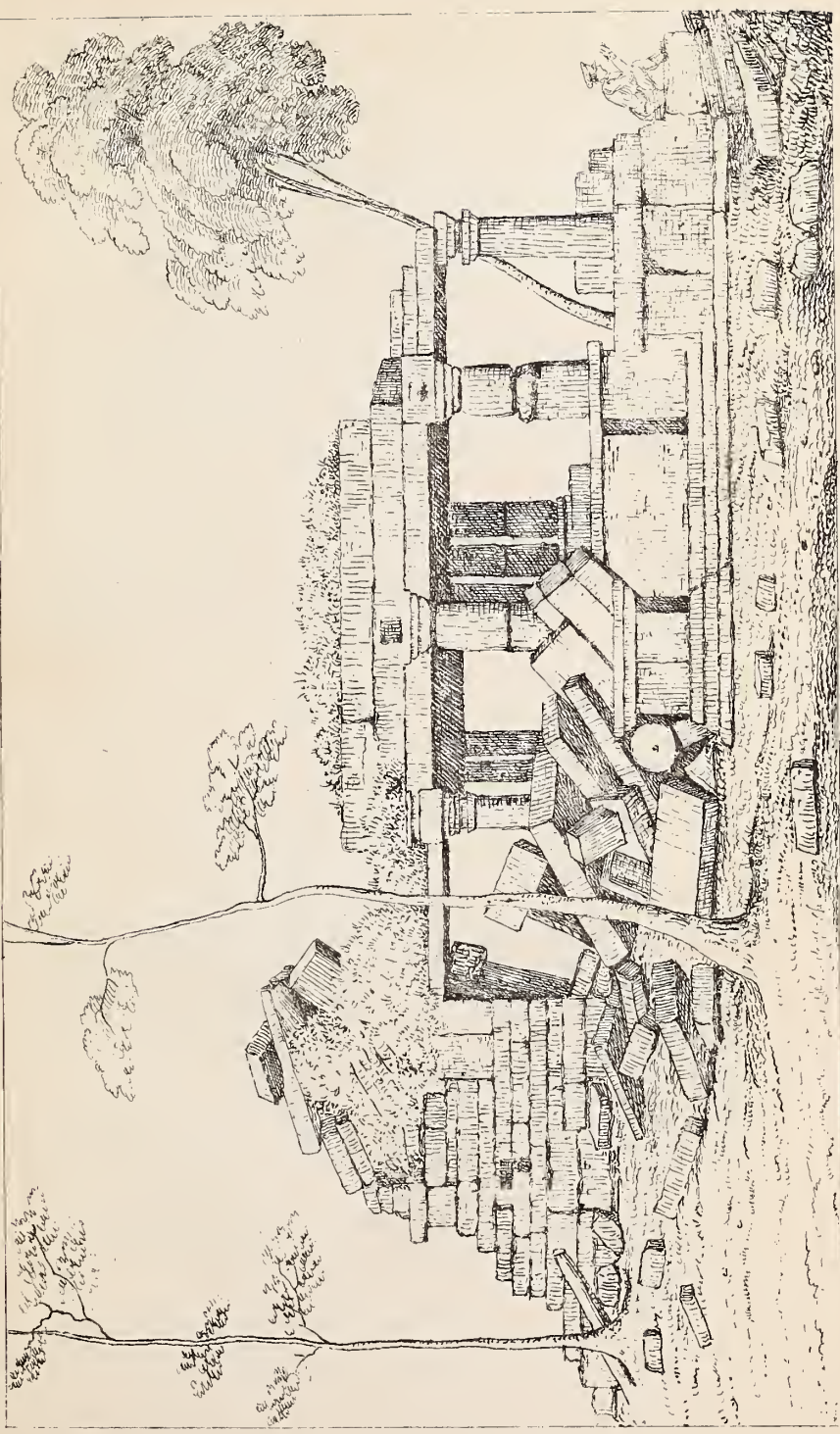
B. atricallosus,† Gould, is a large and elegant sulphur-coloured species with seven whorls. It is a great favorite with Karen females and is often seen strung, with the other species of the genus, on their necklaces. They call it Kló-bau, Kló-bang, *the yellow shell*. The Burmans call it Bying-klhá, *heron's dung*. "Length $1\frac{1}{3}$ inches; breadth 1 inch. It is of the same type as some of the shells from the Philippine Islands, as *B. vittatus*, *dryas*, and *maculiferus*."

B. moniliferus, Gould, is a variagated shell with seven whorls, for the most part sinistral, but I occasionally meet with dextral shells. "Length $\frac{1}{5}$; breadth $\frac{7}{10}$. Differs from *B. contrarius* and *B. lævus*, Müll., by its angular aperture, and the colour of its lip and throat."

I have met with one species of *Clausilia*, the largest species of the genus known. Dr. Gould named it *C. insignis*, but subsequently wrote *C. insignis* is *C. cochinchinensis*, Philippi, published about the time I received your specimens."

* *C. involvulus*, Benson.—Eds.

† *B. citrinus*, Lam. var. E., Swainson.—Eds.



On the flowering shrubs in my garden in Tavoy, I occasionally found a species of *Succinea*, which Dr. Gould has named *S. semiserica*. "Length $\frac{1}{2}$ inch; breadth $\frac{3}{10}$ inch; height $\frac{3}{20}$ inch. Its shape is like *S. tigrina*, Fer., and it is well characterised by the silky-white or pearly surface of the anterior half of the shell."

The genus *Vitrina* is represented by *V. præstans*, (Gould;) a very delicate shell and the largest species of its genus. "Greatest length $\frac{4}{5}$ of an inch; height $\frac{2}{5}$ of an inch. The colour is dark straw-colour, or amber-colour, inclining to green."

Under every pile of fallen leaves, under every brick that has laid a few weeks on the grass, and every fallen timber, may be found in Tavoy a small, sulphur-coloured species of *Achatina* with eight whorls; *A. octona*.

In the same localities, and in company with the above may be occasionally seen a small red species of *Pupa*; *P. mellita*, Gould. "Length $\frac{9}{40}$; breadth $\frac{3}{40}$. The general aspect of the shell is not unlike that of *Achatina octona*."

*On the Antiquities of Sargujá and its neighbourhood; by Lieut.-Col.
J. R. OUSELEY.*

To the Secretaries of the Asiatic Society.

MY DEAR SIRS,—On the 19th of last month I despatched to the address of Mr. Piddington, for the Society, a complete Lingam and Jhiléri or Argah, from the deserted fortress of Jooba, in the Pál Pergunnah of Sargujá. The people of the country cannot account in any way as to the era in which it was made, or when even Jubá itself was deserted, nor can the Rájá of the country, Mahárájá Amar Sinha Deva Bahádar. He surmises the period to be long prior to the Ballan Dynasty. The Ballans were expelled by his ancestors, many generations ago.

Mánpura, the chief town of the Pál Parganah, is about 2 or 3 miles North West of Jubá; the latter is situated in a gorge of the

hills, on the shoulder of one is the Fort, and below, among the tree jungul, are the remains of carved stone temples and stone walls, now lying about in fragments, or nearly covered by the accumulations of burnt and rotten leaves; among them was this Lingam, which having a well carved face and head projecting from the surface (of the Lingam) I thought it desirable to send it to you—with its Argah or Jhiléri.*

At Maháli, a place $8\frac{1}{2}$ miles North West of Mánpura, I observed a long cut stone* lying on the ground in a field and had it turned over. I was glad to find that there was an inscription on it of the year 1296 Samvat, with several figures, in relief; Captain Kittoe took off impressions of the inscription, after I brought it to Chotá Nágpara. I think it appears to be a sati stone. Captain Kittoe considers it to be a record of a victory. I conclude that some of the Pandits at Calcutta will be able to make out the purport of the Legend. Pal is the Northern Parganah of Sargujá, and the borders not above 70 or 80 miles from the town of Mirzápara.

Within 9 miles South West of Lakhanapura (west of the tablelands of the Moympat) is the celebrated Rámgarh temple, situated on a hill of that name. I send a rough sketch (Pl. III.) of the remains of the temple on the top of the hill, which is about 3,100 feet in height. The antiquity of the temple must be very great. Captain Fell, Professor of Sanscrit, endeavoured to reach these temples, but failed, being attacked with fever and dying on the road. The temple having partially fallen, I could discover no beejuk. In the centre of this sandstone hill is a fine coal-bed, over which flows a spring, called the “Thoora Panee;” it is on the right of the road ascending (about half way up); proceeding along the Eastern skirt of the hill—near the Northern extremity, is a very singular tunnel of about 25 feet in width by 15 or 20 high, which runs for 140 or 150 yards horizontally through the hill whether artificial or natural, I cannot determine, opening into a beautiful basin, which would have been a lake but for the tunnel through which a small stream runs. Turning to the left, on passing the tunnel, you come to the face of the Rámgarh Hill, and in this face are excavated some wonderful caves, with small stone figures in them; wild animals now take up their abode in the caves; the impressions of a tiger’s feet were

* An account of these will be given hercafter.—EDS.

freshly made in the sand of the stream, in the tunnel. Within 4 or 5 miles East of the Rámgarh hill, is another Mánpura, a small village. The Kéhar river runs from South to North, within a mile and a half of it; on the banks is a temple, the main body of which is built of brick, and the porch, &c. in front, of stone, facing the East, has entirely fallen, but only part of the brick temple itself, which is built of the most beautiful brick. I sent one of the bricks to the Society. I have thought it desirable to send a rough sketch I made of this brick temple, which is supposed to be several thousand years old. There are in a direct line North of this temple, no less than 10 or 12 others, all lying in ruins, built of sandstone; time having much defaced the very beautiful carving. In no other temple could I detect brick, and no appearance of mortar having been used in any. These temples deserve particular examination and more time, than I could devote to them. They are Brahminical, I have no doubt, from the figures of Ganésa, &c. There are many tanks now nearly filled, and others in good order, in every direction round the temples.

At Dipádi, a place 80 or 90 miles East of this, near Chulgulli, are a great many temples precisely like these, of sandstone, and carved in the same manner, but overthrown as by an earthquake, and many all but covered over by dust-storms, &c.

A hot spring exists at Tata-páuí (hot water); in Sargujá the heat of the water is 184° Fahr. and the smell very disagreeable; an old temple is to be seen here in ruins; the country appears to be volcanic. I formerly had the pleasure of sending several bottles of the water, carefully filled on the spot by Captain Hannyngton, Deputy Commissioner, to Mr. Piddington, with some remarks on the place, but I have heard nothing further on the subject as regards the analysis.

This country (Sargujá) is well worthy the attention of the Geologist; its coal, iron, gold, ochre, marble, lime, &c. are most valuable. The height of the inhabited parts above the sea from 1,500 to 3,600 feet. The climate cool, agreeable, and healthy; the scenery beautiful. Rivers in every direction, woods and hills, on which are extensive table-lands at about 3,300 feet in height. For the sportsman, few places in India can excel this. The Gour abound, Deer of all sorts, wild Buffaloes, Elephants, Tigers; in fact all, but the Rhinoceros, of the animals of India.

The period is not distant when I hope to see European colonization attempted. The table-land of the Maynepat, extending for 50 miles East and West, by 30 miles wide, at an altitude of 3,300 to 3,700 feet, is admirably adapted for the speculations of Europeans, the native population is thin, there only existing 16 inhabited villages in the whole Maynepat table-land, and not above 250 inhabitants (men, women and children). It is too cold for the people of the plains, about 1,200 or 1,400 feet below. In these hills are a race of people who are stated to devour their own parents when too old to work, the "Kowrahs." They do it as a religious duty, I am informed; are almost naked, and are seldom or ever seen.

I remain,

My dear Sirs,

Your's very faithfully,

J. R. OUSELEY.

Chota Nagpore, Nov. 6, 1847.

I forgot to mention, that the name of the brick temple, is "The Charkhá Déwal," and of the Tunnel, the "Hath Phore"—and that of the chief cave temple in which are four stone figures, "The Sitámari."

Inscription from the Vijaya Mandir, Udayapúr, &c.

We sometime ago received from Capt. J. D. Cunningham a large packet of inscriptions copied with very great labour and zeal at Sanchi, Udayapúr, Ehrin, and other localities within the Bhopal Agency. On examining these carefully one by one, we find that nearly all of any interest have already been published in the Journal; so thoroughly have the antiquities of that neighbourhood been exhausted by the industry of Capt. C.'s predecessors. The subjoined Mithraic hymn from the Vijaya Mandir at Udayapúr, appears however, to be new: the English version is from the pen of our Librarian.

उदयपुरस्य विजयमंदिरशिलोपरिलिखितं स्तोत्रं ।

॥ ॐ नमः सवित्रे ॥ विवर्त्तमानसंसारबन्धनातिशयादिहम् । विभां-
तं तिमिरारातिमंशुमन्तमुपास्यहे ॥ १ ॥ सूर्याद्वैतद्युतिपरिवृष्टस्तोत्र
मेतद्विविक्तच्छंदोमुद्रास्तवकतिलकं प्रोक्तपौराणतत्वं । निर्मातुं मां ह्यभ-
मतिमपि अद्धानं प्रबोधप्रौढिप्रादुष्करणिपुणस्तप्यमानः प्रयुङ्क्ते ॥
२ ॥ त्वत्तेजःप्रतिवह्निकापरिणतः सर्वस्वमुष्णद्युते शीतांशोः परिपीय
कौशलकलादीत्यौघधीसंपदः । ताः पीयूषमुषर्बुधेकिलज्जतास्तस्यामराः
कीर्त्तनं तत्वं तन्मनसाप्यमेयमहिमं स्वेतत्तुसत्यब्रुवे ॥ ३ ॥ यदनश्वर-
मय्यक्तं यत्तं यच्च विनश्वरं तद्विरूपं तव ज्योतिर्ज्योतिषामीश्वरं
स्तुमः ॥ ४ ॥ यदयत्तमखुब्रह्मज्योतिस्तेऽन्तःप्रकाशकं तदेव यत्तमनखुज-
गन्मूर्त्याविवर्त्तते ॥ ५ ॥ संसारप्रतिकामकर्म्मनिवहोच्छेदात्प्रमोदास्पदं
ध्यानोपार्जितबोधमार्जितमनोरंगत्तरंगायितं ज्ञेयं यत्क्लियोगिभिः
कथमपि ज्योतिस्तदेतत्परं ब्रह्मैकांतविवर्त्तमानभुवनाभोगं दिवि द्योतते
॥ ६ ॥ विदन्ति वहिरुद्योति ज्योतिस्ते चर्मचक्षुषः चिन्मात्रमाज्जतछान्त
खान्तर्हृद्विचक्षुषः ॥ ७ ॥ एतत्त्वदात्मकं विश्वं त्वं वा विश्वात्मकः स्फुटं
संवित्तिरिति तज्ज्ञानमज्ञानं भेदसौहृदं ॥ ८ ॥ कामं कामाद्यरिपरिकर
खांदिताः कांदिशीका रे लोकाः संशयविषयिनोनाश्रयन्ते भवन्तः ॥
आराध्यै न सपदि विपदामर्गलं दुर्गपालं किं नाच्छुभ्रं विशत विष्टतदार
निर्वाणदन्तं ॥ ९ ॥

मुखे धर्मकर्मवान्वाङ्मनः सूर्यस्तुतिमान् प्रपश्यन्निर्वाणं ।

Om! Salutation to Savitá! We worship the luminary, who is an enemy to darkness, who shines, and destroys the strong shackles of this revolving earth.

2. This eulogium on the unrivalled effulgence of the sun,—a nosegay made of the finest flowers of poetry, and containing *pauránic* allusions, was composed by me, who, though weak-minded, am zealous, and was inspired by Him, who dispenses heat, and is able to develope our intellect.

3. O Sun! the moon having imbibed the rays of *thy* reflected light attained her wealth of the health-promoting herb,* which produces *amrita* (nectar) when offered in oblation to the fire, which *amrita* again is sought by the gods;—therefore I say, verily thy greatness is inconceivable!

4. Thy visible rays are liable to destruction, but thy invisible rays are eternal, therefore thy rays are two-fold:—O Lord of light! we salute thee.

5. Thy invisible rays are atomic, and the cause of our soul, and the visible exist in the form of the creation.

6. He, who by eradicating worldly desires becomes the source of conferring happiness, and like a billow plays on the ocean of intellect purified by knowledge and meditation, can be somewhat appreciated only by the devout. That pure light positively is the great Bráhma which shines in the heavens, and is the cause of the happiness of this passing world.

7. The ignorant (lit. film-eyed) believe him to be the light that is seen, but the learned (lit. clear-sighted) know the purifier of minds to be the Great Mind.

8. He, who knows thee to be the life of the world,—or, the world a part of thee,—is a *gnyani* (learned), but he who thinks otherwise, is a dunce.

9. Ye cowards! infatuated by worldly passions, and ever actuated by doubts ye take not his protection: Why not by worshipping him, who is a bar to misfortune, approach the contented Commander, who leaves you a wide open door to the stronghold of salvation?

He attains salvation who prays the sun orally and mentally, and performs virtuous actions.†

The subjoined is the legend of a copperplate grant presented to the Society some time ago by Brigadier Stacy: the translation of this also is by Babu Rajendra Lal Mittra. This grant is remarkable as contain-

* The moon plant (*Sarcostema viminalis*).

† The last sentence is in prose.

ing the genealogy of Sri Venayaka Pála Deva in duplicate, first engraved upon the grant and then cast in relief upon the seal.

ॐ । स्वस्तिः । श्रीमहोदयसमावासितानेकनौहस्यश्वरथपत्तिसम्पन्नः
 शुद्धाचारः परमवैष्णवोमहाराजः श्रीदेवशक्तिदेवस्तस्य पुत्रस्तत्पा-
 दान्तख्यातः श्रीभूयिकादेव्यामुत्पन्नः परममाहेश्वरोमहाराजः श्रीव-
 न्यराजदेवस्तस्य पुत्रस्तत्पादान्तख्यातः श्रीसुन्दरी देव्यामुत्पन्नः परम-
 भगवतीभक्तोमहाराजः श्रीनागभटदेवस्तस्य पुत्रस्तत्पादान्तख्यातः
 श्रीमहीसटादेव्यामुत्पन्नः परमादित्यभक्तोमहाराजः श्रीरामभद्रदेव-
 स्तस्य पुत्रस्तत्पादान्तख्यातः श्रीमदप्पादेव्यामुत्पन्नः परमभगवतीभक्तो-
 महाराजः श्रीभोजदेवस्तस्य पुत्रस्तत्पादान्तख्यातः श्रीचन्द्रभट्टारि-
 कादेव्यामुत्पन्नः परमभगवतीभक्तोमहाराजः श्रीमहेन्द्रपालदेवस्तस्य
 पुत्रस्तत्पादान्तख्यातः श्रीदेहनाशादेव्यामुत्पन्नः परमवैष्णवोमहा-
 राजः श्रीभोजदेवस्तस्य भ्राता श्रीमहेन्द्रपालदेवस्तस्य पुत्रस्तत्पादा-
 न्तख्यातः श्रीमहीदेवीदेव्यामुत्पन्नः परमादित्यभक्तोमहाराजः श्रीवि-
 नायकपालदेवः प्रतिष्ठानभुक्तान् बाराणसीविषयसम्बद्धकाशीपारपथ-
 कप्रतिवद्धटिक्कारिकाग्रामे समुपगतान् सर्वानेव यथास्थाननियुक्तान्
 प्रतिवासिनश्चेदमाज्ञापयति, उपरिलिखितग्रामः सर्वायसमेत आच-
 न्द्रार्कक्षितिकालं पूर्वदत्तदेवब्रह्मदेववर्जितोमया पित्रोः पुण्याभिवृ-
 द्धये, दर्भिसगौत्रायाथर्वसब्रह्मचारिभट्टभुक्ताकाय, षड्यां गङ्गायां स्ना-
 त्वा प्रतिग्रहेण प्रतिपादित, इति विदित्वा भवद्भिः समनुमन्तव्यं, प्रति-
 वासिभिरप्याज्ञाः श्रवणाविधेयभूताः सर्वाया अस्य समुपनेया इति,
 श्रीहर्षेण प्रयुक्तस्य शासनस्य स्थिरायतः ॥ सम्बत्सराः ६५ भास्फाल्गु-
 वदि ६ निवद्धं ॥

Om ! Prosperity ! Distinguished by the possession of innumerable war boats, elephants, horses, cars and foot soldiers, (was the reign of)

the pious and Vaishnava (a) Mahárāja Srí Devasacti Deva. He was succeeded by his son—born of Srí Bhumiká Devi, the great Máheswara (b) Mahárāja Vanyarāja Deva, who was followed by his son—born of Srí Sundarí Devi, Mahárāja Srí Nágabhata Deva, a worshipper of Bhagavati. His son, Mahárāja Srí Rámbhadra Deva—a worshipper of Aditya, (c) and born of Srí Mahisatá Devi, succeeded him, and was followed by his son—a worshipper of Bhagavatí (d) and born of Srí Madappá Devi, Mahárāja Srí Bhoja Deva; who was succeeded by his son, Mahárāja Srí Mahendra Pála Deva, a worshipper of Bhagavatí, and born of Srí Chandrabhattáriká Devi. His son, the *Vaishnava* Mahárāja Srí Bhoja Deva, born of Srí Dehanásá Devi, succeeded him. Srí Mahendra Pála Deva was his brother; whose son and successor, born of Srí Mahideví Devi, Mahárāja Srí Vinayaka Pála Deva,—a great worshipper of Aditya, to the respectable and permanent inhabitants assembled in Tikkariká, a village situated in the district of Báránasi (Benares), on the opposite bank of Kási, thus addressed: “The aforesaid village, with all its revenue exclusive of what has been already presented to Devtas or Bráhmanas,—for the period of the duration of the sun, the moon, the earth, and time—in order to the promotion of my parents’ virtue, after due ablutions performed in the Ganges on the 6th day of the moon, was presented by me to my class-fellow in the study of the Atharva Veda, Bhulluka Bhatta, of the family of Darbhisa, knowing this you should abide by it and submissively pay to him all the revenue.” Sriharsa composed this to give permanency to the grant.

Done on the 6th day of the dark half of the moon, in the solar month of *Phálguna*, in the year 65.

(a) A worshipper of Vishnu.

(b) Worshipper of Mahádeva.

(c) Sun.

(d) The goddess Durgá, the wife of Shiva.

Addenda et Corrigenda of the paper on the Aborigines of the Sub-himalayas, in the December No. of the Journal. By B. II. HODGSON, Esq.

Page 1237 at the word 'Bhutan,' add foot note. Pemberton in his Report assigns the following position and extent to Bhutan. $26\frac{1}{2}^{\circ}$ to 28° N. L. and $88\frac{3}{4}^{\circ}$ to $92\frac{1}{4}^{\circ}$ E. Long. Length 220, and breadth 90, miles.

Page 1238. Dele the long foot note on Hemachal, and substitute appendix No. I. hereafter given.

Page 1241. For 2000 read 1800 ; and for 500, 480 as the length and breadth of Tibet.

Page 1242. Dele the 8 first lines and substitute—' That valley is of a lozenge shape, about 20 miles in extreme length and width, cultivated highly throughout, and 4200 to 4700 feet above the sea. Lat. of Cathmundu $27\frac{2}{4}^{\circ}$ N. The only other valley in the whole eastern half of the Sub-himalayas is that of Júmla or Yúmila, which is smaller and higher, yielding barley (*hordeum celeste*) as the greater valleys rice ; whilst in the western half of the Sub-himalayas is the single though large vale of Cashmir, 160 miles long by 60 broad, and 6000 feet above the sea.

The Sub-himalayas form a confused series of enormous mountains, the ranges of which cross each other in every direction, but still have a prevalent tendency to diverge, like ribs from the spinal column of the snows, or a S. E. and N. W. diagonal between 28° and 35° .'

Same page. Add at top of the series of basins and of peaks, ' Alpine basin of Indus... No peak' ; and alter the subsequent numeral mention of basins, in reference to population, accordingly.

Page 1243, 'for 'Dijond' read Dinjong. Same page line 19, after the words 'aqueous system can alone reveal,' Add, 'Of the innumerable rivers the only ones with ascertained transnivean sources are the Indus, the Satlege, the Karnáli, the Sánpú vel Brahmáputra, and the Arún, whereof the 4 first take their rise at Gangri, the great water shed of the plain of Tibet, close to lake Mepang vel Manasróver, and the 5th or Arún, from the northern slope of Hemachal in the district of Tingri. They are, as might be expected, the largest of our rivers, both the

Karnáli and the Arún, within the mountains, exceeding the Jumna or Ganges.

It is probable though unascertained that the Painomchú and Monas, in addition to the rivers above given, have transhimalayan sources, and are identical respectively with the Pá or Nai-chú and the Monchú of Klaproth, whilst his Kongbong is, most likely, the Subhansri, and his petit Tchembo, the Dihong; which last stream, or the Lohit, must be identified apparently with the Sápú vel Brahmáputra. Permanand, who accompanied Wilcox and Burlton, and explored further than either of them, thinks the Lohit is the Sápú: Major Hannay contends for the Dihong, which he says is properly called Dhang, a word almost the same with Dzang whence, with the affix po, we derive Sápú. The great river is styled Dzang-po, recte Tsang-po; that is, of or belonging to Tsang, which is the western half of the central province of Tibet.

It seems possible that the Subhansri, the Dihong, the Dibong, and the Lohit, are, some of them, defluents of the Sápú, whilst others of them, with separate sources, are affluents. Collectively they must be held, at present, to constitute the Sápú vel Brahmáputra; for, it is certain that the Sápú is *not* the Irawádi; nor have we any grounds for assigning an eastern continuation to the former river comparable in validity to those which lead us to make it turn westward and traverse Assam.'

Then add, 'after ruggedness of the surface,' the words 'of the Subhimalayas.'

Comparative Vocabulary, Kirauti, first column, for 'Bhag,' read 'Phag.'
Lepchu column, for 'Kazen' read 'Kazeu.'

Second page, foot note, for 'Jiming, good,' read 'Jigú, my goods.'

Third page, foot note, for 'expresses in, eu in declension,' read 'expressions in, on, in declension.'

In the next note, for Gnúing, read Gnún.

Newar column, for 'Khau, Da, Ang,' read, 'Khau, Dú, Ang.'

In the last page of the Vocabulary the Lepcha adjectives are given only in one form, whereas there should be two, as Arhúm vel Rhúmbo. Azeu vel Zeubo. Amyen vel Myenbo, &c. One form is as common as the other. But the last is important, as helping the demonstration of the affinity of this tongue to that of Tibet, an unquestionable fact, though denied by the high authority of De Coros. He who can reach

the roots, and separate them from the servile or accessory particles, and can, moreover compare structures as well as vocables, will have no hesitation in affirming the common relationship of all these tongues to the language of Tibet, though the *prima facie* differences are certainly often remarkable, and viewed collectively, not less instructive with reference to the history and formation of dialects.

APPENDIX I.

The vast limitary range of snows to the North of India, has been known in all ages by names derived entirely from Sanscrit, the Greeks and Romans neither coining fresh appellations nor even translating the sense of the Indian ones into their own languages, but adopting almost unaltered the Sanscrit names they found. These are Hemáchal, Hemaachal, snowy mountain. Hemádri, Hema-adri, the same. Hemálaya, Hema-alaya, place of snow. Hemódaya, Hema-údaya, source of snow, (as Suryódaya, source of sun or East). From the last term the Greek *Cemodus* is deduced without alteration. The following tables, showing the relative height of the great Andean and Himalayan peaks, and the connexion of the latter with the physical geography of Northern India may prove interesting, since no one but myself I believe is in a position to note the connexion of the snowy peaks with the distribution of waters quoad the Eastern half of this magnificent theatre of Nature's vastest display.

Andean Peaks.		Himalayan Peaks.	
Sorato,	25,400	Nanda Devi,	25,749
Illimani,	24,350	Dhavalagiri,	27,060
Desya cassada,	19,570	Gosain than,	24,700
Descabesado,	21,100	Kanchan Jhinga,	24,000
Chimbarazo,	21,441	Cholo,	26,000

HEMALAYAN PEAKS.

Names.	Relations.
No known peak,	Basin of Indus, Alpine Panjab.
Nanda Devi (above Rohilkhand),	{ Alpine Gangetic basin, East end. Alpine Karnalic basin, West end.
Dhavalagiri (above Gorakpoor),	{ Alpine Karnalic basin, East end. Alpine basin of Gandac, West end. Naraini.
Gosainthan vel Dayabhang (above the valley of Nepal),	{ Alpine basin of Gandac, East end. Trisul. Alpine basin of Cosi, West end, Sún Cosi.
Kanchan Jhinga (above Sikim),	{ Alpine basin of Cosi, East end, Tamvar. Alpine basin of Tishta, West end, Bomchu.
Cholo (above Bhutan),	{ Alpine basin of Tista, East end, Paimomchu. Alpine basin of Monas, West end, Baréli.

The latter of the above tables shows with distinctness the connexion that exists between the greatest elevations of the snowy range and the aquatic system of the Sub-himalayas, so that the great snow peaks are really entitled to be considered *divortia aquarum* on the Indian side of the snows, whatever may be the case on the Tibetan side: and, it is observable that at those points where the transnivean origin of our rivers necessitates a partial reference of our aquatic system to extra Indian limits, there no such towering snowy peak seems to demark the Alpine Sub-himalayan basin as in cases where our aqueous system is altogether our own and Cisnivean. Thus we have no peak to define the basin of the Indus on its western *or* eastern margin. At least, I know of none, though Pargyúl may in part be considered a water shed, and so, at the other end of the chain, may Chumalari. Both peaks however are detached and stand on the plain of Tibet. Cholo is near to Chumalari and not detached. Of the innumerable rivers of these regions the only ones with ascertained transnivean sources, are the Indus, Sutlege, Karnáli, Sanpu and Arún, whereof the four first take their rise at Gangri, the great water shed of the plain of Tibet, close to Lake Mepang vel Manasrovar, and the fifth or Arun, from the Northern slope of Hemáchal in the district of Tingri. These 5 rivers are, as might be expected, the largest of the whole, both the Karnali and Arun exceeding the Ganges or Jumna within the mountains, and being nearly equal the one to the other. Gangri is probably the Kailas of the Hindus, whence diverge to the four quarters of the compass the 4 great rivers of Bhárat des. I have said above that only 5 of our rivers have trans-himalayan sources. It is however probable, though unascertained that the Painom-chú and Monas arise beyond the snows and are identical respectively with the Naivel Pá-chu and the Mon-chú of Klapproth. Chú vel Tchú means river, so that in the one case we have an absolute identity of names, and nearly so in the other (Pá-Pai, the root.)

Klapproth's determination, to make the Sanpu something else than the Brahmaputra has led him to overlook the several large streams descending into Bhutan and Assam. Had he been aware that his Shokbaja is Shu vel Bhutan, and his Mon vel Moun, the Cis-himalayans generally, he must have been more accessible to recent evidence against his theory.*

* *Memoires relatifs a l'Asie* 3. 370—417 and Map.

With regard to the heights of the Hemalayan peaks, of the 5 given, the two first are Webb's and Herbert's, the 3rd Colebrooke's and the 4th and 5th Waugh's, communicated verbally, the results of his recent operations not having yet been completely worked out. The peak called by me Cholo, Capt. W. supposes to be Chumalari: but the natives say otherwise. Capt. W.'s positions for triangulation* were at 85 miles distance. Capt. Herbert justly observes that, unequalled and vast as is the elevation of the Giants of Hemáchal, no adequate conception of the vast mountain mass can be formed by merely adverting to them. The best way is to contemplate the whole extent and general elevation of the snowy region spreading over some 1800 to 2000 miles, with a breadth or depth of 20 miles, peaks above 5 miles high, distributed throughout *its whole extent*, and passes similarly extended, yet *seldom or never falling below 15,000 feet*: and all this though we admit Humboldt's somewhat theoretic negation of the general opinion that Hemachal, and not, as he contends, Kuenlun, is the chain which divides Asia from end to end!

APPENDIX II.—*On the physical type of the Tibetans.*

The accompanying profile and full face sketches† exhibit a faithful and characteristic example of the Tibetan race. The person selected to type his countrymen was Phúchung, a native of Digarchi in Utsang, or Central Tibet. He was a fine young man of 23 years, but rather below than above the average height and bulk. Height 5.6, without shoes. Length of head, 0.9½. Girth of head, 1.11½. Crown of head to hip, 2.3½. Hip to heel, 3.0. Breadth of chest, 1.0.0. Shoulder point to shoulder point, 1.3½. Arm and hand, 2.3¼. Girth of chest, 2.90. Girth of arm, 0.10. Girth of thigh, 1.6½. Girth of calf, 1.2½. Length of foot, 0.9¾. Length of hand, 0.7. Breadth of hand, 0.4.0.

A stout good humoured looking lad, fleshy and broad, but scarcely so tall or massive as the majority of his race. Colour, a full clear brunet, fully as dark as the Sub-hemalayans, nay, more so. No red whatever on the full cheeks (January). Hair of head, thick, black, coarse, straight, copious, cropt except near the crown, where it is plaited

* Tanglo and Singchal in Sikim, 10 miles apart.

† These came to hand too late for the present number. They will appear in the next.
—Eds.

into a tail that reaches to the hips. Moustache small. No beard Nor any hair on the chest. Nor any whisker. Face large, wide, ovoid, nearly as wide between the cheek bones and angles of the jaws (where the spaces are equal) as long from the top of the forehead to the chin. Forehead low but not very noticeably narrowed or retiring, except by comparison with very fine heads. Frontal sinuses large and the brows consequently, heavy. Hair of the eyebrows and eye lashes, ample. Eyes of good size and form with hardly a noticeable degree of obliquity, but the orbital cavities too much encumbered with flesh which presses on the lids. Iris dark brown. Bridge of the nose sunk to a level between the widely separated eyes, but of good length and well raised elsewhere, though too broad and fleshy, and the nostrils too round for beauty. Zygoma large and salient, and the cheeks full and heavy of flesh. Angles of the jaws likewise prominent and as wide as the cheek bones. Mouth large, with full protruded lips, advanced almost as forward as the tip of the nose, yet well formed and the teeth fine in form, set and colour. Upper lip long, jaws large, chin small and rather retiring, vertical line of the face pretty good, but the mouth the most salient part; the forehead and chin being both slightly withdrawn from the front. Ears large and prominent. Head well formed and round, full enough in the fore part but low. Body well made and well proportioned; massive but not dumpy. Trunk rather long but not awkwardly so, nor the arms at all unduly elongated. Muscular and stout, but the legs superior to the arms in muscular development, expression of the countenance cheerful and pleasing, but the Mongolian cast of features strongly marked.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JANUARY, 1848.

ANNUAL MEETING, 12TH OF JANUARY, 1848.

The Rev. Mr. McQUEEN, in the chair.

The accounts and vouchers for December 1847, were submitted.

Henry Alexander, Esq. C. S., was named as a candidate for election at the February meeting, proposed by Mr. Blyth, seconded by R. W. G. Frith, Esq.

Letters were read as follows :—

To the Secretary Asiatic Society.

MY DEAR SIR,—I shall be obliged by your taking my name off the List of Subscribers of the Asiatic Society, until better times come, when I shall be proud again to be enrolled.

Your's faithfully,

WILLIAM THEOBALD.

December 22d, 1847.

From G. A. Bushby, Esq. Secretary to Government of India, Home Department, transmitting copy of a paper by the Baron Des Granges, entitled "A short survey of the countries between Bengal and China, showing the great commercial and political importance of the Burmese town of Bhammoo, on the Upper Irrawaddy." (Ordered to be published).

From Wm. Grey, Esq. Under Secretary to the Government of Bengal, conveying the sanction of Government for the enclosure and appropriation of a piece of ground adjacent to the Society's premises, and lately occupied as a Police Thanna.

From the Officiating Deputy Surveyor General of India, forwarding the Meteorological Register for December, 1847.

From E. C. Ravenshaw, Esq., communicating an abstract statement

of the fall of rain at Patna, during the last $5\frac{1}{2}$ years. (Ordered to be published).

From R. N. C. Hamilton, Esq., Resident at Indore, forwarding a facsimile impression from two copper tablets dug up in the vicinity of the town of Oojein, with a translation by the Librarian, Rajendralal Mittra. (Ordered to be published).

From R. McIvel, Esq. forwarding a fine specimen of Carbonate of Strontia, found at Simla.

From J. W. Laidlay, Esq., enclosing a note of the daily rate of evaporation in Calcutta in 10ths. and 100ths. of an inch, from January to December, 1845.

From D. Cunliffe, Esq. Magistrate of Monghyr, announcing despatch of eight ancient Hindu coins recently found in his district, and which are surmised to have been in circulation in the reign of the great Vikramáditya.

From the Moulvi Abdoollah, proprietor of the Indian Press, offering several works published at his own and at the Lucknow Presses, and deficient in the Society's Library, in exchange for the Fátawe Alumgíri, Sharya ul Islam and Taríkh i Nadiri. (Referred to the Oriental Section.)

From Charles Huffnagle, Esq. submitting extract of a letter from the President of the Academy of Natural Sciences of Philadelphia, who is desirous of obtaining certain volumes of the Journal and Researches, deficient in their collection. It was unanimously agreed that the volumes specified be presented to the Academy through Mr. Huffnagle.

From Mr. H. Piddington, presenting a copy of his Horn Book of Storms for all parts of the world.

From Mr. Piddington, a brief paper on the Nizam's Diamond, for publication in the Journal.

From Col. OUSELEY, through Mr. PIDDINGTON.

I have the pleasure to send one of two Iron Cramps I find adhering to the stories of the old Hill Temple at Rampore in Surguja. I dare say the Iron is good, but it must be *thousands* of years old.

Yours very sincerely,

J. W. OUSELEY.

The Annual Report of the Council of the Society for the year 1847, having been read by the Senior Secretary, and the accounts for the year submitted, it was moved by Dr. O'Shaughnessy, seconded by Mr. Laidlay, and agreed unanimously, that the Report and Accounts be

printed and circulated to the members, and brought up for final consideration at the February meeting.

The meeting then proceeded to the election of Office-Bearers for 1848, when the following gentlemen were chosen :—

PRESIDENT—J. W. Colville, Esq. Advocate General.

VICE PRESIDENTS—The Lord Bishop.

The Hon. Sir John P. Grant.

H. M. Elliott, Esq. C. S.

J. W. Laidlay, Esq.

COUNCIL—G. A. Bushby, Esq., Welby Jackson, Esq.,

W. P. Grant, Esq., Capt. A. Broome, S. G. T.

Heatley, Esq., W. Grey, Esq., R. W. G. Frith, Esq.,

Lord Arthur Hay, Dr. Walker,

W. Seton Karr, Esq., Dr. Jas. Dodd.

SECRETARIES—W. B. O'Shaughnessy, Esq., J. W. Laidlay, Esq.

Dr. E. Roer, *Oriental Department.*

The permanent officers remaining as before. During the election the Senior Secretary stated that it had been ascertained by the Council that the Bishop of Calcutta is prevented by the state of his health and his public duties, and Sir J. P. Grant by his intended departure—from accepting the office of President—and that 27 members had addressed a requisition to the Council for the nomination of Mr. Colville to the office vacated by Lord Hardinge's departure.

LIBRARY.

The following books have been received since the last meeting.

Presented.

Horary Meteorological Observations made at the Hon'ble the East India Company's Magnetical Observatory at Madras. By Capt. S. O. E. Ludlow.—BY THE MADRAS GOVERNMENT.

Die Kaukasischen Glieder des Indoeuropaischen Sprachstomms. von Franz Bopp.—BY THE AUTHOR.

Rapport Annuel fait a la Société Asiatique dans sa seance Generale, du 14 Juin, 1847. Par M. Jules Mohl.—BY THE AUTHOR.

The Calcutta Christian Observer for December 1847, and January 1848.—BY THE EDITORS.

The Indian Atlas, Nos. 50, 56, 79, and 107.—BY THE GOVERNMENT OF INDIA.

The Oriental Christian Spectator, Vol. 8, Nos. 11 and 12.—BY THE EDITOR.

Tatwabodhini Patricá. Nos. 52, 53.—BY THE TATWABODHINI SABHA.

The Annual Report of the Tatwabodhini Sabhá for the year of Sakáditya 1769.
—BY THE SAME.

Nityadharmánuraujicá, Nos. 39 @ 48.—BY THE EDITOR.

The Oriental Baptist, No. 13.—BY THE EDITOR.

The Upodeshaka, No. 13.—BY THE EDITOR.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of November 1847.—BY THE OFFICIATING DEPUTY SURVEYOR GENERAL.

The Sailor's Horn-Book for the Law of Storms; being a practical exposition of the theory of the Law of Storms, and its uses to Mariners of all classes in all parts of the world, shown by Transparent Storm Cards, and Useful Lessons. By H. Piddington Esq.—BY THE AUTHOR.

Memoires de la Société Royale des Antiquaires du Nord, 1845—47.—BY THE SOCIETY.

Antiquarisk Tidsskrift, udgivet af det Kongelige Nordiske Oldskrift—Selskab, 1843—45.—BY THE EDITOR.

Exchanged.

The Athenæum, Nos. 1043-44.

The Edinburgh New Philosophical Journal, No 86.

Journal Asiatique, 4me Série, Nos. 445-6-7.

The London, Edinburgh and Dublin Philosophical Magazine, No. 209.

Purchased.

The Annals and Magazine of Natural History, Nos. 133-4.

The North British Review, No. XV.

Comptes Rendus, Hebdomadaires des Seances de l'Academie des Sciences. Tome XXIV. et XXV. Nos. 1 á 16.

Journal des Savants. Aout et, Septembre, 1847.

Histoire Naturelle des Poissons, par M. Le Baron Cuvier, et par M. A. Valenciennes. Tome XX.

*Report of Curator, Zoological Department.**

The donations received by the Society since its last meeting are as follow:—

1. Rustomjee Cowasjee, Esq. A dead female Ostrich, which has been mounted as a stuffed specimen, and the bones also are preserved. A fine skeleton of a male is likewise in the museum (IX, 727).

2. Baboo Rajendro Mullick. A living adult female Monkey, of a species nearly allied to *Macacus cynomolgus* and *M. carbonarius*, the habitat of which remains to be ascertained. This animal resembles *M. cynomolgus*, except that (as in *M. carbonarius*) there is no sign of crest upon the vertex, and it is parti-

* For December, 1847. The Zoological Curator's Report for November, 1847, was printed with the 'Proceedings of the Society' for December of that year.

cularly distinguished by its long and erect greyish beard and whiskers, surrounding the face, with the help of a considerable fringe of projecting hair upon the brows, causing the eyes to appear deep sunk and altogether imparting a very peculiar physiognomy. Also the living Squirrel, No. 14 a, described in XVI, 872.

3. The Raja Buddenath Roy. A dead female white English Turkey, equaling in size the males of the race bred in this country. The specimen has been mounted; and I have presented the Society with a fine male of the same breed, which has been prepared as a skeleton.*

4. Mr. Birch, of the Pilot Service. A variety of *Crustacea* procured at the Sandheads, comprising some interesting specimens, and among them some of a Crab allied to *Gonoplex* and *Macrophthalmus*, which is new to the Society's collection.

5. From the Barrackpore menagerie. A fine dead specimen of a Lory (*Eos ornata*).

6. Mr. W. Johnson. A young living Monkey, of the species *Macacus radiatus*.

7. Major Jenkins, Gowhatti. A perfect skin of a black Leopard; and skins of various species of *Anatidæ*.

8. Capt. E. F. Smith, 2nd Command 1st Assam Lt. Infantry, Sadyia. A skin of *Felis marmorata*, Martin, and one of *Sciarus bicolor*: Assam being a new locality for the former species; and a variety of *F. bengalensis* occurring there, which is apt to be mistaken for *F. marmorata*. This variety is the *F.*

* The Turkeys of Bengal, or more properly of Chittagong (where great numbers are bred), are of small size, with the pendulous appendage and wattles of the head and neck greatly developed. Degenerate in the extreme from the wild race of America, they are incapable of flight, and are singularly helpless and dependent. If suffered to drink at will, they will continue sipping till they distend their huge craws, and inconvenience themselves not a little by so doing. They are almost invariably black, which was doubtless the colour of their imported ancestors. But for the table they are excellent, and in great demand; and most of those brought hither from Chittagong are purchased by people of French descent, who fatten them at Chandernagore for the Calcutta market. In Calcutta, the reputed Chittagong Turkeys are at a discount, for it is not generally known that the Chandernagore birds are received from Chittagong in the first instance: the management, however, of the newly imported Chittagong Turkeys is little understood in Calcutta. Although this bird was necessarily unknown in the Old World before the discovery of the New, it is regarded by the Mussulmans of India as unclean, the tuft of bristles on its breast inducing them to suppose that it partakes of the nature of the Hog: moreover, the bare head and neck of the Turkey imparts a somewhat Vulturine appearance, which may well help this prejudice in the East; and it is worthy of remark, that some English Turkeys which I possessed would constantly associate with a pair of the *Otogyys pondicerianus* that were secured each by a chain, themselves evidently assuming the degrading consanguinity.

Charltoni, Gray, v. *Ogilbii*, Hodgson, and is connected by intermediate grades of variation with ordinarily marked individuals of *F. bengalensis*.* As compared with Malacca examples of *F. marmorata*, the skin from Assam is more fulvous than usual, and the markings somewhat more nearly approximate those of *F. macrocelis* (v. *Diardii*); but the much smaller size of the feet at once distinguishes it from that species, whether old or young: the under-parts are also whiter than usual, spotted with fuscous-brown; and the dark markings of the tail are rusty-brownish instead of black. Nevertheless, the species is decidedly true *F. marmorata*.

9. Mr. Pinsent, of the 'Precursor' S. V. A living young female of *Gazella dorcas*, from Aden.

10. R. W. G. Frith, Esq. Some skins of Malacca birds, comprising the novelties described in my Report for September last (XVI, 1179). Also a young specimen of what I consider to be *Tupaia javanica*, Horsf., from Malacca, identical with *T. peguana*, Lesson, from Arracau and Tenasserim, and quite distinct from the ordinary *T. ferruginea*, Raffles, of the Malayan peninsula, which alone is included in Dr. Cantor's list.† Among the birds presented, are the *Alcedo nigricans* and *Batrachostomas affinis*; *Spizaëtus nipalensis (niger)*; and *Buceros rhinoceros* with half-grown casque, *B. malayanus* (v. *bicolor*, v. *anthracinus?* Tem., with white supercilia), *B. nigrirostris* (fæm.), and *B. carinatus* (v. *galeritus?* Tem., juv.); also *Philentoma velatum* (*Drymophila velata*, Tem., v. *Muscicapa pectoralis*, A. Hay), and two or three other small species.

11. Mr. E. Lindstedt. A specimen of the common *Megaderma lyra*, procured in the Soonderbuns.

12. J. W. Laidlay, Esq. An exceedingly rusty-tinged specimen of *Presbytis entellus*, procured in the vicinity of Junghypore; also some skins of *Paradoxurus typus*, F. Cuv., and sundry other specimens, comprising the skin of a young *Pteromys* from Cherra Poonjee. This I recognise as of the large Assamese race mentioned in XVI, 866, 868; but would like to examine and compare more specimens of it, before asserting its peculiarities of colouring to be constant. It seems intermediate to the grizzled variety of *Pt. magnificus* and the *Pt. oral* of peninsular India. From the former (like *Pt. albiventer*, v. *inuotatus*), it differs

* Some time ago, Major Jenkins favored us with living specimens of *F. bengalensis*, both of the ordinary marking and of the variety referred to, which have since died and are mounted in the Society's museum; and I have now received, from Mr. Elliot, for transmission to Barrackpore, a living specimen of his *Wagati* Cat of the Eastern Ghâts, termed *Leopardus Ellioti* by Mr. Gray; and I do not consider that this differs specifically: the markings of the individual being merely of a somewhat bolder pattern than usual, and more filled up with black than I remember to have seen previously.

† That a *Tupaia* exists in Central India, I was informed some time ago, I think by Capt. Tickell; and it has now been procured by Mr. Walter Elliot.

in the absence of the great pale patch upon the shoulders ; the anterior toes and the entire hind-feet are black ; the tail is grizzled like the back to near its tip, which is largely terminated with black, and less abruptly so than in the Himalayan races ; the under-parts are strongly tinged with rufous-brown ; and the general hue is darker than in the grizzled variety of *Pt. magnificus*, and more grizzled with pure white than in *Pt. albiventer*. Whether it would attain the size of the latter cannot be determined from the present young specimen, though I think I can safely aver that it does so ; and, upon the whole, it more resembles *Pt. albiventer* than the grizzled variety of *Pt. magnificus*, although very closely allied to both of these named *Pteromydes*.

E. BLYTH.

Mr. Blyth's Supplementary Report refers to the Society's collection of African Vertebrata, which were exhibited to the meeting.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Dec. 1847.

Days of the Month.	Maximum Pressure observed at 9h 50m.					Minimum Pressure observed at 4 p. m.					Rain Gauges. Elevation. Feet	Moon's phases.		
	Barometer reduced to 32° Fahrenheit.	Of the Mercur.	Of the Air.	Of the Wet Bulb.	Direction from sunrise to 9h 50m.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Of the Mercur.	Of the Air.	Of the Wet Bulb.			Direction from 4 p. m. to 4 p. m.	Aspect of the Sky.	Maximum Temperature.
1	In. 30.057	74.9	75.0	65.9	N. W.	Cirro strati.	29.942	79.2	77.6	64.5	N. W.	Cirro cumuli.	81.2	
2	.047	68.5	68.6	62.8	N. W.	Cloudy.	.938	75.2	73.7	62.9	N. W.	Ditto.	77.3	
3	.046	70.0	70.2	63.0	N. W.	Cirro strati.	.912	77.0	75.3	62.3	N. W.	Clear.	78.5	
4	.052	71.0	71.2	64.0	N. E.	Ditto.	.960	76.5	74.8	64.0	N. W.	Cirro cumuli.	79.2	
5	.091	71.5	72.0	64.7	N. W.	Ditto.	30.021	78.5	77.0	66.0	N. W.	Cumuli.	80.2	
6	.124	71.0	71.0	64.0	N. W.	Clear.	.055	77.4	75.8	65.0	N. W.	Clear.	78.2	
7	.126	71.2	71.7	65.1	N. W.	Ditto.	.093	78.5	76.8	66.3	N. W.	Ditto.	80.0	
8	.133	70.6	71.4	65.0	N. W.	Ditto.	.096	77.5	76.2	64.8	N. W.	Ditto.	78.7	
9	.064	70.0	70.5	61.8	N. E.	Ditto.	29.917	77.4	75.2	63.0	N. W.	Ditto.	79.2	
10	29.980	70.9	71.5	64.0	N.	Ditto.	.866	77.0	75.5	65.0	N.	Cirro cumuli.	78.3	
11	.980	71.2	71.5	65.2	N.	Ditto.	.870	79.1	77.5	67.4	N.	Clear.	80.1	
12	.971	72.8	72.5	65.5	N.	Cirro cumuli.	.851	80.2	78.5	66.0	N.	Clear.	81.3	
13	.966	70.2	70.4	62.9	N. E.	Cloudy.	.898	71.0	70.5	65.5	N. by E.	Cirro Cumuli.	71.8	
14	.943	69.2	69.4	65.0	N. E.	Ditto.	.860	71.0	70.6	65.2	N. by E.	Drizzly.	72.6	
15	.964	68.0	68.3	61.5	N.	Ditto.	.864	72.5	72.0	63.9	N. W.	Cloudy.	74.8	
16	.983	65.0	65.9	57.8	N.	Cirro Cumuli.	.369	73.5	71.7	62.2	N. W.	Clear.	74.2	
17	30.002	68.0	69.0	62.0	N. E.	Clear.	.884	75.2	73.3	62.2	N. W.	Clear.	76.8	
18	.046	67.5	68.0	61.2	N.	Ditto.	.923	76.0	74.3	62.0	N. W.	Ditto.	77.6	
19	.083	67.2	67.6	60.8	W.	Ditto.	.963	77.5	75.4	63.3	W.	Ditto.	78.3	
20	.060	69.5	70.6	62.4	W.	Ditto.	.930	77.2	75.4	64.0	N. W.	Ditto.	79.5	
21	.023	67.0	68.2	61.3	N. W.	Ditto.	.900	77.0	75.5	64.6	N. W.	Ditto.	78.4	
22	.049	69.0	70.1	63.2	W.	Ditto.	.912	78.9	77.0	63.5	N. W.	Ditto.	80.0	
23	.088	69.7	70.8	67.5	N. W.	Cumuli.	.959	78.5	76.9	64.0	N. W.	Ditto.	79.9	
24	.046	70.4	71.3	63.0	N. E.	Clear.	.945	79.9	78.2	64.5	N.	Ditto.	80.7	
25	.093	72.9	73.2	63.4	N.	Clear.	.971	80.9	79.3	64.7	N.	Clear.	82.3	
27	.099	72.2	72.5	63.4	N.	Clear.	.999	75.8	74.3	59.9	N. W.	Clear.	77.5	
28	.143	67.2	68.2	61.5	N. W.	Clear.	.975	73.2	71.7	57.5	N. W.	Ditto.	74.3	
29	.110	64.2	65.3	56.2	N. W.	Ditto.	.931	76.7	75.2	63.9	N.	Clear.	78.2	
30	.110	64.2	65.3	56.2	N. W.	Ditto.	.931	76.7	75.2	63.9	N.	Clear.	78.2	
31	.110	64.2	65.3	56.2	N. W.	Ditto.	.931	76.7	75.2	63.9	N.	Clear.	78.2	
Mean	30.047	69.6	70.0	63.0			29.931	76.7	75.2	63.9			78.2	
													0.00	0.05

Days of the Month.	Maximum Pressure observed at 9h 50m.				Minimum Pressure observed at 4 p. m.				Rain Gauges. Elevation. Feet 40 Upper Inch 4 Lower Inch	Moon's phases.			
	Barometer reduced to 32° Fahrenheit.	Of the Mercur.	Of the Air.	Of Wet Bulb.	Direction from 9.50 a. m.	Temperature.	Of the Mercur.	Of the Air.			Of Wet Bulb.	Aspect of the Sky.	Maximum Temperature.
1	In. 30.149	65.7	66.3	61.0	N. W.	***	74.4	73.0	61.0	N. W.	***	76.7	•
2	122	68.2	68.5	62.0	N. W.	Clear.	29.969	75.5	73.6	59.8	Cirro cumuli.	76.8	•
3	104	65.4	66.0	60.2	N. W.	Ditto.	.960	74.9	73.5	56.4	Cirro strati.	76.2	•
4	.958	65.4	66.7	57.3	N. W.	Ditto.	.914	74.0	72.4	57.9	Clear.	74.9	•
5	.041	65.3	66.5	58.3	N. W. sp.	Ditto.	.906	73.9	72.5	56.0	Ditto.	84.8	•
6	.051	62.9	63.9	53.2	N. W. sp.	Ditto.	.928	74.2	72.8	55.6	Ditto.	75.0	•
7	.086	63.8	65.9	56.5	N.	Ditto.	.982	73.5	71.9	55.0	Ditto.	74.5	•
8	127	65.0	66.4	58.1	N.	Ditto.	30.005	75.8	74.3	59.0	Ditto.	76.1	•
9	115	62.9	65.4	56.9	N.	Ditto.	29.984	77.1	69.7	59.0	Ditto.	78.2	•
10	124	66.2	68.7	58.8	N. W.	Ditto.	30.017	78.5	77.1	60.7	Cirro Cumuli.	80.0	•
11	125	68.5	70.1	60.0	N.	Ditto.	29.996	78.9	77.3	62.2	Ditto.	80.5	•
12	102	68.0	69.2	60.0	N. sharp.	Ditto.	.948	77.0	45.6	58.5	Ditto.	77.8	•
13	.021	68.5	68.7	55.5	N. W.	Cumuli.	.877	74.5	72.8	56.7	Clear.	75.8	•
14	29.994	65.4	68.0	60.0	N. W.	Clear.	.886	76.4	74.9	57.8	Cirro cumuli.	78.8	•
15	30.125	67.4	68.0	56.9	N.	Ditto.	.984	77.2	75.2	57.4	Clear.	78.0	•
16	127	64.8	65.9	56.3	N. W.	Ditto.	.967	75.8	74.5	56.8	Clear.	76.7	•
17	.094	65.4	66.5	56.0	N.	Ditto.	.931	76.2	74.4	57.2	Ditto.	77.2	•
18	.069	66.8	68.5	59.2	N. E.	Ditto.	.928	76.9	75.4	57.8	Ditto.	78.2	•
19	.066	68.0	70.1	60.2	N. W.	Ditto.	.940	79.1	77.8	60.5	Ditto.	80.6	•
20	.039	63.0	70.6	61.0	S. W.	Ditto.	.888	80.5	79.5	61.4	Ditto.	81.6	•
21	.003	66.1	66.9	62.2	S. W.	Cloudy.	.866	83.0	82.0	67.1	Ditto.	83.4	•
22	.034	67.9	68.4	63.9	N. W.	Clear.	.902	80.4	79.2	60.9	Ditto.	82.0	•
23	.046	69.9	71.4	60.4	N.	Ditto.	.911	79.9	79.0	62.6	Ditto.	81.0	•
24	.033	71.4	72.9	66.7	S. W.	Ditto.	.884	85.0	84.0	67.0	Ditto.	86.0	•
25	.005	72.2	74.0	65.3	N. W.	Ditto.	.858	84.6	83.5	68.9	Ditto.	85.2	•
26	.011	76.0	77.9	63.2	N. sharp.	Ditto.	.868	85.0	84.3	65.6	Ditto.	86.2	•
27	.059	72.9	73.8	63.0	N. W.	Ditto.	.929	83.8	82.3	65.9	Ditto.	84.6	•
28	.101	73.2	74.4	65.2	N. W.	Ditto.	.942	82.9	81.7	65.7	Ditto.	83.9	•
29	.088	73.7	74.6	65.4	N. W.	Ditto.	.858	84.9	84.3	65.6	Ditto.	85.9	•
30	29.984	73.4	75.6	65.2	N. W.	Ditto.	.831	86.2	85.4	67.6	Ditto.	86.7	•
31													☾
Mean	30.071	68.0	69.3	60.4			29.929	78.7	77.3	60.8		79.8	

